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# AUTOMOTIVE INDUSTRIES

## *The* AUTOMOBILE

Vol. XLIX  
Number 2

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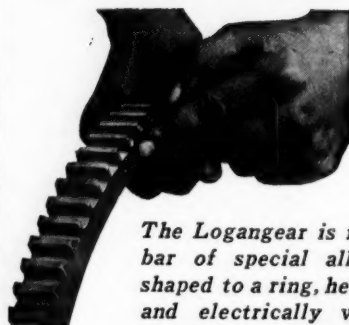
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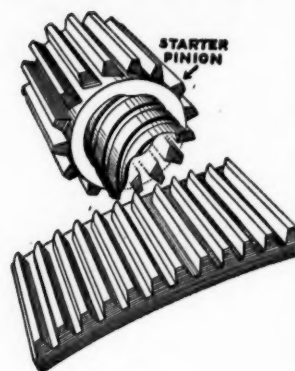
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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLIX

NEW YORK—THURSDAY, JULY 12, 1923

No. 2

## 13,048,128 Was Registration Total on July 1, 1923

Gain of 2,440,001 over 1922 mid-year figures. Increase is 23 per cent. Thirty-seven States already ahead of total for 1922. One motor vehicle for every 8.5 persons. New York still holds first place. Fees go up. Motorcycle registrations drop.

CARS and trucks registered in the United States on July 1, 1923, totaled 13,048,128. This was 2,440,001 more than appeared on the registration books at the same time a year ago, the gain recorded being about 23 per cent.

The six months' figures for 1923 pass the total for the whole year of 1922 by 683,751. All but twelve States have already passed the 1922 total. Even in this dozen of cases the loss is comparatively small.

There is now one motor vehicle for every 8.5 persons in the country, using estimated population figures for July 1, 1923, as a basis of computation.

With figures missing for six States, the fees collected during the first six months total \$147,386,407. This is about \$22,000,000 in excess of the total in July, 1922. If the six missing States were in, this mid-year figure probably would exceed the \$151,384,745, which comprised the total for the entire year of 1922.

Motorcycle registrations, with six States missing, total 127,037, indicating another loss for the two-wheeled vehicle. Last year at this time the total was 154,000 and at the end of 1922 was 193,000.

These mid-year registration figures can be compared directly only with those collected for July 1 of previous years. Failure of registrations in a given State to reach the total of the end of the previous year is of little significance in most cases, since the last six months are almost certain to show a gain. The relation between the mid-year figures and the

year-end figures is affected by variations in law enforcement and similar factors which make comparisons difficult.

Where a State at mid-year has already exceeded the total of the previous year, it is evident that a substantial gain is to be expected by the end of the year.

New York still leads in total registrations, despite the fact that it has dropped behind its Jan. 1 total by more than 10,000. California and Pennsylvania have gained materially in the meantime and occupy second and third places respectively.

**T**HIRTY-TWO States have now passed the 100,000 mark in registrations, while eight States have more than 500,000 cars and trucks in operation.

Ohio has made the greatest gains since last July, its total this year exceeding that of July 1, 1922, by 215,000. The greatest percentage gain for the same period, however, has been made by West Virginia, which records an increase of 40.6 per cent.

California tops the list of persons per vehicle, having one motor vehicle for every 3.9 persons. This indicates that every man, woman and child in California might go for an automobile ride at the same time and enjoy a comfortable trip without being crowded. True, some would have to ride in buses or trucks, but there would be plenty of room for everybody.

Every State has more cars and trucks running today than on July 1, 1922. Ohio shows the largest gain, as



noted. Nevada's gain of 2222 was the smallest in actual numbers, although on a percentage basis it is 21 per cent ahead of a year ago.

The table of actual gains in registration from July 1, 1922, to July 1, 1923, shows no specially significant features. The big increases have been recorded in the States already having a high registration, which is to be expected. The percentage gain in these States, however, might be expected to be relatively small. Study of the percentage gain table, however, shows that this is not the case in certain instances.

California, a big automobile State, not only stands high in actual registration gain, but stands eighth in the table of percentage gain with 28.6 per cent more than last year at the same time. Pennsylvania is another State which shows rapid growth relatively as well as actually. Already having a very large number of cars and trucks in 1922, the Keystone State stands third in actual gains and ninth in percentage gain.

The other high registration States rank farther down the percentage gain scale as might be expected.

Big manufacturing States continue to hold the domi-

nating position as regards total cars and trucks registered. Out of the highest ten, seven are States usually classed as chiefly industrial. The three outsiders in the first ten are California, Texas and Iowa.

Important percentage gains are shown chiefly in the agricultural areas, especially those of the South. Out of the ten States having the largest percentage increase in registration, seven are largely agricultural in character, while six of these seven are located south of the Mason-Dixon line. The number is increased to eight if California be counted as an agricultural State.

### Southern States Low

The Southern States are still at the bottom of the list as regards population per vehicle. The six States which trail the line are Alabama, Mississippi, Georgia, Arkansas, South Carolina, Louisiana and Tennessee. The large colored population in these areas doubtless is responsible for the high population per car. The highest Southern State in this list is Florida, which has 7.6 persons per vehicle. Alabama is the lowest with 24.5 persons per vehicle.

## Registration of Motor Vehicles

State	Total Registration Cars and Trucks	Passenger Cars	Trucks	Motor- cycles	Total Fees
Alabama	98,992	88,239	10,753	322	\$1,348,032
Arizona	40,778	35,061	5,717	309	255,742
Arkansas	97,929	88,136	9,793	263	1,175,100
California	931,610	893,179	38,431	12,245	9,483,750
Colorado (5 months)	167,562	156,500	11,062	1,999	1,024,936
Connecticut	150,913	125,616	25,297	2,141	3,815,653
Delaware	26,300	21,800	4,500	.....	.....
District of Columbia	82,984	75,850	7,134	1,875	440,807
Florida	135,893	113,050	22,843	831	1,810,213
Georgia	148,000	.....	.....	.....	.....
Idaho	53,367	49,067	4,300	542	826,365
Illinois	833,920	728,358	105,562	5,840	8,643,539
Indiana	482,678	424,810	57,868	.....	.....
Iowa	517,228	484,503	32,725	2,691	8,190,758
Kansas	331,936	309,003	22,933	1,458	167,708
Kentucky	175,000	.....	.....	.....	.....
Louisiana	110,000	.....	.....	.....	.....
Maine	94,061	78,597	15,464	1,233	96,475
Maryland (5 months)	157,346	146,893	10,453	3,513	2,744,502
Massachusetts	460,798	390,122	70,676	5,290	5,606,338
Michigan	624,590	562,333	62,257	3,406	8,330,381
Minnesota	405,225	363,039	42,186	2,780	6,734,832
Mississippi	85,645	78,320	7,325	109	963,581
Missouri	412,337	372,853	39,484	1,983	3,391,000
Montana	63,950	57,000	6,950	296	629,491
Nebraska	244,000	219,000	25,000	995	2,574,277
Nevada	12,766	.....	.....	86	133,131
New Hampshire	52,434	.....	.....	1,590	1,022,688
New Jersey	360,577	273,845	86,732	6,997	6,707,283
New Mexico	24,614	.....	.....	52	245,170
New York	991,883	788,358	203,525	16,867	15,772,522
North Carolina	209,400	187,300	22,100	1,450	3,750,000
North Dakota	99,000	96,000	3,000	500	681,000
Ohio	975,000	841,700	133,300	14,080	8,435,069
Oklahoma	240,000	.....	.....	500	2,700,000
Oregon	133,995	123,471	10,524	2,471	3,629,975
Pennsylvania	922,062	777,193	144,869	16,122	14,002,954
Rhode Island	65,207	52,717	12,490	1,248	1,105,259
South Carolina	103,049	94,272	8,777	445	811,220
South Dakota	120,031	110,630	9,401	376	1,882,815
Tennessee	145,000	.....	.....	.....	.....
Texas	571,981	.....	.....	2,723	4,713,000
Utah	54,001	46,550	7,451	635	432,636
Vermont	44,613	41,927	2,686	661	808,926
Virginia	185,076	160,867	24,209	1,400	1,774,027
Washington	224,567	193,176	31,391	2,783	3,518,806
West Virginia	126,531	122,051	4,480	1,009	2,200,000
Wisconsin	418,546	390,010	28,536	4,663	4,465,046
Wyoming	34,753	30,700	4,053	258	341,000
W					
TOTALS	13,048,128	10,192,096	1,376,237	127,037	\$147,386,007



Gains and Losses in Registration July 1, 1922—July 1, 1923		Percentage Gains and Losses in Registration July 1, 1922—July 1, 1923		Car and Truck Registrations July 1, 1923	
Ohio .....	215,000	West Virginia .....	40.6	New York .....	991,883
California .....	208,757	Kentucky .....	35.5	Pennsylvania .....	922,062
Pennsylvania .....	205,418	Mississippi .....	35.1	Ohio .....	975,000
New York .....	179,745	Utah .....	32.6	California .....	931,610
Michigan .....	131,344	Louisiana .....	31.5	Illinois .....	833,920
Illinois .....	157,172	Arkansas .....	30.6	Michigan .....	624,590
Texas .....	122,545	Florida .....	29.4	Texas .....	571,981
Massachusetts .....	93,092	California .....	28.6	Iowa .....	517,228
Missouri .....	73,911	Pennsylvania .....	28.6	Indiana .....	482,678
New Jersey .....	72,718	North Carolina .....	28.5	Massachusetts .....	460,798
Minnesota .....	69,225	Wyoming .....	28.4	Wisconsin .....	418,546
Wisconsin .....	60,578	Oklahoma .....	28.3	Missouri .....	412,337
Indiana .....	57,678	Ohio .....	28.3	Minnesota .....	405,225
Iowa .....	57,159	Texas .....	27.2	New Jersey .....	360,577
Oklahoma .....	53,000	Rhode Island .....	26.9	Kansas .....	331,936
North Carolina .....	46,458	Michigan .....	26.6	Nebraska .....	244,000
Kentucky .....	45,900	Massachusetts .....	25.3	Oklahoma .....	240,000
Kansas .....	43,194	New Jersey .....	25.3	Washington .....	224,567
Washington .....	42,805	Arizona .....	25.1	North Carolina .....	209,400
West Virginia .....	36,281	Tennessee .....	23.9	Virginia .....	185,076
Virginia .....	35,076	Washington .....	23.6	Kentucky .....	175,000
Florida .....	30,964	Illinois .....	23.3	Colorado .....	167,562
Tennessee .....	28,000	Illinois .....	23.2	Maryland .....	157,346
Nebraska .....	27,098	Oregon .....	23.2	Connecticut .....	150,913
Maryland .....	26,715	New Hampshire .....	23.0	Georgia .....	148,000
Louisiana .....	26,376	New York .....	22.1	Tennessee .....	145,000
Oregon .....	25,216	New Mexico .....	22.1	Florida .....	135,893
Connecticut .....	23,140	South Carolina .....	22.0	Oregon .....	133,995
Arkansas .....	22,982	Missouri .....	21.8	West Virginia .....	126,531
Colorado .....	22,562	Maine .....	21.5	South Dakota .....	120,031
Mississippi .....	22,225	Nevada .....	21.0	Louisiana .....	110,000
Georgia .....	21,500	Delaware .....	20.6	South Carolina .....	103,049
South Carolina .....	18,600	Minnesota .....	20.6	North Dakota .....	99,000
Maine .....	16,642	Maryland .....	20.4	Alabama .....	98,992
Rhode Island .....	13,801	Vermont .....	19.0	Arkansas .....	97,929
Utah .....	13,301	Connecticut .....	18.1	Maine .....	94,061
Alabama .....	11,863	Georgia .....	17.0	Mississippi .....	85,645
North Dakota .....	10,281	Wisconsin .....	16.9	District of Columbia .....	82,984
New Hampshire .....	9,826	Colorado .....	15.5	Rhode Island .....	65,207
South Dakota .....	8,534	Kansas .....	14.9	Montana .....	63,950
Montana .....	8,250	Montana .....	14.8	Utah .....	54,001
Arizona .....	7,931	Alabama .....	13.5	Idaho .....	53,367
Wyoming .....	7,696	Indiana .....	13.5	New Hampshire .....	52,434
Vermont .....	7,161	Idaho .....	13.3	Vermont .....	44,613
Idaho .....	6,273	Nebraska .....	12.4	Arizona .....	40,778
District of Columbia .....	4,929	Iowa .....	12.4	Wyoming .....	34,753
Delaware .....	4,500	North Dakota .....	11.5	Delaware .....	26,300
New Mexico .....	4,407	South Dakota .....	7.7	New Mexico .....	24,614
Nevada .....	2,222	District of Columbia .....	6.3	Nevada .....	12,766
Total gain .....	2,440,001	Average gain for U. S., per cent .....	23.0	Total .....	13,048,128

Farm States show up particularly well in this respect. Iowa, Kansas, Nebraska and South Dakota are all near the top of the list.

The rapid increase of cars and trucks as related to population is shown clearly by the fact that on Jan. 1, 1921, there were nine States, which had more than twenty persons per vehicle while only three States are in that class today. At that time, two and a half years ago, three States had less than six persons per vehicle, as against eight in the present compilation.

#### Gain of One Million Probable

Comparison of these July 1 figures with those of Dec. 31, 1922, indicates that the final figures in December, 1923, will record another gain of more than a million in car and truck registrations. At the end of the six months' period, 1923 already runs ahead of 1922 by 683,751, despite the fact that twelve States have not yet registered as many vehicles as they did last year.

There is little doubt but that these twelve delinquents will go over the top before the end of the year. This alone would make the 1923 gain about 750,000 without counting the added registrations that are sure to be made in the thirty-seven States that have already exceeded their 1922 total.

New York, which now lacks 10,410 of its December, 1922, figure, always shows a relatively low registration at the mid-year mark. After recording a considerable decrease in July last year, for example, it came through with a gain of 190,262 at the end of the year. The same

thing has been true of the Empire State in other previous years.

#### Nebraska Drops Behind

Nebraska is further from its 1922 total than any other State. It still has 12,654 to go. The other decreases since December, 1922, are relatively small, ranging from 9659 in Oklahoma down to fifty-two in North Dakota.

Registrations in many of the farm States are expected to go up considerably during the last six months of the year. The big industrial States have absorbed a majority of the cars since January, and manufacturers are looking to the agricultural areas to buy a good many vehicles from now on. To how large an extent this expectation will be realized cannot be determined accurately at the present time, but there is every indication that the farmers will come into the market more strongly when crops have been harvested and they have acquired some cash.

The tables comparing 1922 totals with 1923 mid-year figures show that few gains of importance have been made either actually or relatively in the farm sections. The degree to which the 1923 totals exceed those of 1922 will be determined largely by the buying which develops in rural communities between now and the end of the year.

The accuracy of the mid-year registration data is never so great as that of the final figures at the end of the year. Many States do not keep exact cumulative records so that they can determine the total number of

Gains and Losses in  
Registration  
Dec. 31, 1922—July 1, 1923

<b>Gains:</b>	
Ohio .....	115,496
Pennsylvania .....	92,325
California .....	69,805
Illinois .....	47,730
Texas .....	45,743
Michigan .....	45,610
Wisconsin .....	30,502
North Carolina .....	26,850
Minnesota .....	24,668
Kentucky .....	20,979
Florida .....	20,002
Indiana .....	19,739
Missouri .....	19,368
New Jersey .....	18,951
Iowa .....	17,080
Virginia .....	16,076
West Virginia .....	13,768
Arkansas .....	11,504
Massachusetts .....	10,960
Tennessee .....	9,284
Alabama .....	8,940
Mississippi .....	8,644
Louisiana .....	7,716
South Carolina .....	7,071
Colorado .....	5,234
Utah .....	4,845
Kansas .....	4,742
New Hampshire .....	4,141
Wyoming .....	4,116
Washington .....	3,610
Arizona .....	2,744
Georgia .....	2,416
Delaware .....	1,740
Maine .....	1,522
Montana .....	1,301
Vermont .....	732
Nevada .....	119
<b>Losses:</b>	
Nebraska .....	12,654
New York .....	10,410
Oklahoma .....	9,659
Maryland .....	8,278
South Dakota .....	5,207
Connecticut .....	3,762
District of Columbia .....	2,441
Rhode Island .....	1,259
New Mexico .....	859
Idaho .....	507
Oregon .....	234
North Dakota .....	52
<b>Net gain.....</b>	<b>683,751</b>

Percentage  
Gains and Losses in  
Registration  
Dec. 31, 1922—July 1, 1923

<b>Gains:</b>	
Florida .....	17.3
North Carolina .....	14.8
Kentucky .....	13.6
Ohio .....	13.4
Wyoming .....	13.4
Arkansas .....	13.3
West Virginia .....	12.2
Mississippi .....	11.2
Pennsylvania .....	11.1
Alabama .....	9.9
Utah .....	9.8
Virginia .....	9.4
Texas .....	8.7
New Hampshire .....	8.5
California .....	8.1
Michigan .....	7.8
Wisconsin .....	7.7
Louisiana .....	7.5
South Carolina .....	7.3
Arizona .....	7.2
Delaware .....	7.1
Tennessee .....	6.8
Minnesota .....	6.4
Illinois .....	6.0
New Jersey .....	5.5
Missouri .....	4.9
Indiana .....	4.2
Iowa .....	3.4
Colorado .....	3.2
Massachusetts .....	2.4
Montana .....	2.0
Vermont .....	1.6
Georgia .....	1.6
Maine .....	1.6
Washington .....	1.6
Kansas .....	1.4
Nevada .....	0.94
<b>Losses:</b>	
Maryland .....	5.0
Nebraska .....	4.9
South Dakota .....	4.1
Oklahoma .....	3.8
New Mexico .....	3.3
District of Columbia .....	2.8
Connecticut .....	2.4
Rhode Island .....	1.8
New York .....	1.0
Idaho .....	0.94
Oregon .....	0.17
North Dakota .....	0.05
<b>Average gain for U. S., per cent</b>	<b>5.5</b>

Persons Per Motor Vehicle  
July 1, 1923

California .....	4.0
District of Columbia .....	4.4
Iowa .....	4.8
Kansas .....	5.4
Nebraska .....	5.5
South Dakota .....	5.5
Colorado .....	5.9
Nevada .....	6.1
Wyoming .....	6.1
Indiana .....	6.2
Minnesota .....	6.2
Oregon .....	6.2
Ohio .....	6.3
Michigan .....	6.4
Washington .....	6.4
Wisconsin .....	6.5
North Dakota .....	6.8
Florida .....	7.6
Vermont .....	7.9
Illinois .....	8.1
Maine .....	8.3
Missouri .....	8.3
New Hampshire .....	8.5
Texas .....	8.6
Massachusetts .....	8.7
Delaware .....	8.8
Idaho .....	8.8
Utah .....	8.8
Oklahoma .....	9.0
Arizona .....	9.3
New Jersey .....	9.4
Montana .....	9.5
Maryland .....	9.6
Rhode Island .....	9.6
Connecticut .....	9.8
Pennsylvania .....	9.9
New York .....	10.9
West Virginia .....	12.3
North Carolina .....	12.8
Virginia .....	12.9
Kentucky .....	14.1
New Mexico .....	15.1
Tennessee .....	16.5
Louisiana .....	16.8
South Carolina .....	16.9
Arkansas .....	18.5
Georgia .....	20.2
Mississippi .....	20.9
Alabama .....	24.5
<b>Average U. S.....</b>	<b>8.5</b>

vehicles registered up to any given time. Estimates frequently constitute the only information available as of July 1. The figures are close enough, however, for all practical purposes and are entirely reliable for general use.

A good bit of confusion in registration figures still exists in several States, rendering accuracy difficult to obtain. The situation in Minnesota has been improved materially since the law requiring annual registration took effect two years ago, but the workings of the new law do not seem to have been perfected entirely up to the present time.

In Arkansas the department which has charge of motor

vehicle registration has been left without funds, through the failure of the State Legislature to provide an appropriation at its last session for this work. Consequently, the registration of cars and trucks probably will stop on July 1. Unless a special session of the Legislature provides funds very quickly, the Arkansas figures available in December will be little more than a guess.

Registration practice is being improved constantly, however, in many States and each year more accurate and more detailed data are being made available. Complete lack of uniformity still exists, of course, throughout the country and there is little hope for any real progress toward standardization of registration methods.

Motorcycles  
Gains and Losses, July 1, 1922, to July 1, 1923

<b>Gains:</b>		<b>Losses:</b>			
Pennsylvania .....	413	New York .....	10,133	South Dakota .....	109
Minnesota .....	280	Massachusetts .....	3,774	Nebraska .....	106
Maine .....	160	Ohio .....	2,920	Colorado .....	101
Arizona .....	124	California .....	2,054	Virginia .....	100
New Hampshire .....	97	Michigan .....	793	Rhode Island .....	89
Arkansas .....	71	Illinois .....	583	North Dakota .....	84
Utah .....	70	District of Columbia .....	482	Idaho .....	59
West Virginia .....	59	Florida .....	456	New Mexico .....	55
Oregon .....	47	Iowa .....	398	South Carolina .....	52
Montana .....	45	New Jersey .....	367	Mississippi .....	26
Nevada .....	6	Alabama .....	276	Vermont .....	8
Wyoming .....	5	Kansas .....	256	Washington .....	5
		Maryland .....	239	Oklahoma .....	4
		Wisconsin .....	150	Connecticut .....	3
		Texas .....	110	<b>Net Loss.....</b>	<b>27,220</b>



# Substantial Business Is Probable for Rest of Year

Volume not likely to be as large as in first half. Tapering off in production under way preparatory to inventory taking and new models. Nothing in general outlook to cause alarm in spite of fears felt in some quarters. Country is prosperous.

By James Dalton

**A**T no time in more than a year and a half has there appeared to be so much obscurity about the immediate business outlook for the automotive industry. It is puzzling executives in all branches of the trade and they are scanning the horizon closely for navigation signals. Up to this time they have sighted few lighthouses or even buoys.

They are no worse off in this respect, however, than the navigators of other business seas. Practically everybody is sailing by dead reckoning. Even the professional pilots appear to be somewhat muddled.

"Trained seals" who send out weekly economic forecasts disagree even more widely than usual. One of them, who has consistently advised clients not to sell stocks but to hold them for the rise which he predicted, now has sent out a special letter advising them to sell on all "bulges."

Bankers and brokers and other trained observers can't find a common platform on which to stand. They are divided into two schools, one pessimistic and the other the reverse.

There are big chunks of gloom in the air but in the meantime business is sailing along, carrying almost as much sail as it did two or three months ago. The skippers of these business ships are being mighty cautious, however, and are prepared to scurry into harbor at any moment.

Seldom in the history of American business has there arisen so paradoxical a situation. No one seems to know exactly what is the matter with the stock market. There are all kinds of theories but it is possible to pick flaws in all of them. The "street" always has boasted that it has been able to discount by six or eight months impending business depression and there are a good many who seem to think such a discount is being taken now.

It is true that stocks have slumped sharply a considerable period in advance of all business declines but history records that there have been long continued stock declines which have not been followed by business debacles.

The best reason for believing that there will be no serious depression soon is that so many people seem to be expecting one and are so well prepared to meet it.

## Sound Securities Closely Held

Most stocks, even many of those which scarcely can be classified as speculative, have lost a considerable part of their quoted values in the past few weeks. It must be remembered, however, that the securities of most corporations which are solidly established are rather closely held by investors. Comparatively little of this stock has been on the market.

If a company has 250,000 shares of common stock, for example, and 200,000 shares are held by investors who are

satisfied with their dividends and not much concerned about exchange quotations, there are left only 50,000 shares with which speculators can play. In most cases it has been these speculative shares which have been juggled in Wall Street of late.

Small traders have bought, held on for a rise and then sold. This process may have been repeated time after time with the same stock. Then the repeated warnings against inflation halted the rise a couple of months ago. Some of the holders of speculative shares hastened to sell and then there was more speculation on the short side of the market with many of the traders goaded on by fear of further losses.

## Significance of Stock Operations

There is reason to believe that investors in the securities of many substantial companies have increased their holdings of late and that the number of shares on the market has been considerably reduced. In many cases quoted values are below actual values. If a sound stock now selling at 50 is paying 4 per cent dividends the yield to the buyer is 8 per cent.

Present operations in the stock market would have much more significance if values generally were inflated, if business houses were over extended, if money rates were high, if bank loans had reached huge proportions, if commodity prices were skyrocketing, if there had been general over production and if manufacturers had on hand large unbalanced inventories.

If all or even several of these conditions prevailed there might be substantial reason for thinking that Wall Street, with what it admits is "uncanny foresight," was discounting a future period of deflation.

As a matter of fact, however, none of these conditions prevails. Except in a few lines, such as sugar, commodity prices have not been inflated for speculative purposes. Building material prices have risen because of the law of supply and demand. Few raw or finished products are being hoarded for higher prices. Production in almost all lines has been limited to current demand. The volume of bank loans for speculative purposes has been small.

Periods of depression always follow periods of inflation, but where there has been no inflation there is nothing to deflate. Toy balloons will burst with a bang if you touch a cigarette to them when they are inflated but nothing whatever happens under the same circumstances when they are not blown up. It's the same with business.

Two months ago commodity prices were beginning to get out of bounds, manufacturers were bidding against each other for labor and materials and they were beginning to borrow money in an attempt to increase production by outbidding their competitors.



If this process had continued business would have run on the rocks of inflation but, happily, cautionary signals were heeded in time. AUTOMOTIVE INDUSTRIES said in its issue of April 12:

"There is no reason why sound prosperity should not continue indefinitely if reasonable caution is practiced as well as preached.

"All that is necessary to avert the suffering which always follows inflation, speculation and runaway markets, is the application of sound business principles.

"If the automotive industry is conservative and is governed by principles which it knows to be sane, it cannot fail to have a prosperous year. If it runs wild it is likely to lose in the later months much of what it makes in the first six months."

### Industry Governed by Sane Principles

Up to the present the industry has been governed by these sane principles. The same can be said of industry generally, with a few isolated exceptions. There has been some slowing up in the past two months but not much. The changed attitude has been sufficient, however, to check the upward trend of commodity and material prices and the tendency now is down rather than up. The more conservative course which has been followed has been the best thing which could possibly have happened.

There is plenty of evidence that the tide of business still is running high. Any one who has followed the situation is familiar with the symptoms. Car loadings are running a little more than 1,000,000 a week and establishing new records for this period of the year. New summer marks are being set in several lines. There has been only a slight recession in the iron and steel industry. There has been some slowing up in building construction but it has not been serious. Such as there has been has had a salutary effect on costs.

Altogether there seems no sound excuse for the pessimism which prevails in many quarters. The "psychology of fear" is just as dangerous as the fever brought on by the reckless pursuit of profits which leads the victim to cast caution to the winds.

Up to this time there has been nothing even remotely resembling a "buyers' strike." A good many people have curtailed their consumption of sugar because of the exorbitant price charged for it. Many building projects have been held up because of excessive costs. It is evident the public will not pay what it considers an unfair price for the things it doesn't absolutely need.

This determination to resist exploitation doesn't indicate anything except common sense on the part of the public, however. It has an exceedingly stabilizing effect on prices in general. It means that the country has passed from a sellers' to a buyers' market.

### Spread of Fear Dangerous

It is quite possible, however, for the "psychology of fear" to spread until it will infect the country generally. If it does it probably will result in most persons restricting their buying to bare necessities. That is the most serious possibility of continued hammering at the quoted values of stocks. So long as speculators play among themselves it causes little harm but if their present pessimistic spirit is carried to the country as a whole it may result in a temporary reaction.

Volume of business is determined by the degree of confidence felt by the nation as a whole. When people are not especially worried about the outlook for the immediate future they buy what they want if prices are "right." When they are worried they buy only what they must have regardless of price.

The automotive industry, both in the passenger car and

truck fields, is dependent for its prosperity upon the prosperity of the country as a whole. The nation today is prosperous and there is no reason why it shouldn't continue to be indefinitely unless this "psychology of fear" which followed warnings against recklessness is carried too far.

Thus far this year the sale of motor vehicles has exceeded the expectations of the most incurable optimists. The first six months brought enough business to make a pretty good year even if plants close entirely the second half. They won't, however, for there is every indication that sales will continue on a substantial basis.

Uncertainties in the general situation make it hazardous to predict what will be the volume of trade in the automotive field. One peculiarly uncertain factor is the probable size of the farm market. Crop prospects are still somewhat uncertain although the outlook is reasonably good so far as size is concerned, but the prices farmers will get for their products is another question. Export demand has much to do with determining domestic prices for food-stuffs and export demand just now is rather conspicuous by its absence. As a consequence farmers are discontented. When they are discontented they are not likely to plunge into an orgy of buying.

Automotive manufacturers have banked on a heavy farm demand this fall and they may not be disappointed but it will not be wise to stake too much on it. Some makers who have found the demand for open cars rather sluggish in the cities and industrial centers have believed that they could sell in the agricultural areas any surplus they might have on hand as soon as harvests were under way. It will be well for them to determine definitely what this market is going to be before they build up too much of a reserve.

### Sales Holding Up Well

Unless a company has extraordinarily large resources which may justify accumulating reserve stocks in a slack season to be in a position to get the jump on competitors when demand revives, production should be held closely to actual current demand.

Motor vehicle production in June was surprisingly large. The estimated total of 375,000 was less than 20,000 under the May mark. No definite information is available concerning the relative volume of retail sales for June and May but it is highly probable June business fell off more than 20,000 as compared with the preceding month. If this is true it is self-evident that some cars were stocked but the number was not large enough to be serious for retail sales held up surprisingly well. Dealers generally report that they expect a good business the rest of the year although it will not be up to the levels of the earlier months.

Output of cars and trucks began to taper off the middle of June and the total for July undoubtedly will be considerably smaller than it was last month. This will be due in part to the taking of inventory and in part to preparations for getting into production on new models. It will be amazing if the volume in August is not smaller than it is this month.

Little in the way of over-production need be feared for the next two months because factories usually plan for a slowing down in July and August. Sales promise to be larger than they usually are in mid-summer but September demand will do much to determine what schedules should be the remainder of the year and it will be well to proceed cautiously until that knowledge is available. Some keen observers believe fall sales in most sections will be limited almost exclusively to closed cars except in the lowest price classes.

Whatever price readjustments must be made should be announced in connection with new models. Increases covering improved quality and added equipment probably will be justified but they should be kept as small as possible. Price considerations are likely to have more effect on buying the remainder of the year than they did the first half.

Much of the sensational prosperity of the industry in the past year and a half has been due to the fact that it has been content with reasonable profits. In this connection it should be remembered that the rise in material costs appear to have been checked and there are no run-away markets in sight. If a company has a large production it is wise to absorb relatively small increases in manufacturing costs in order to maintain or increase production rather than hand them on to purchasers, provided the original margin of profit was reasonable.

There is considerable speculation about what Ford contemplates in relation to prices. His production now exceeds 7,000 a day and his price has remained the same since he passed the 6,000 a day mark. There have been reports that he proposed a price reduction. Although these reports are absolutely unconfirmed officially, it is probable the added volume has brought considerably increased profits per car even in the face of somewhat higher material costs. A reduction, therefore, does not seem impossible.

#### Where Are Sales Going?

"Where are they going?" is just as legitimate a question now as it has been at any time for a year and a half. By the same token it is just as difficult to answer. Nevertheless, with so large a part of the total contributed by Ford and Chevrolet, it can be accepted that persons of moderate means, many of them first buyers, have composed the main army of purchasers.

A considerable number of farmers undoubtedly have bought cars in this price class but most of them have gone into the towns and cities, particularly the industrial centers. Artisans have been getting big wages for a considerable period and some of their earnings have gone into

automobiles. It has been easy for them to buy on the time payment plan. No one knows how many buyers remain in this class. It probably will depend almost entirely on how long good times continue.

**In considering the farm market for the remainder of the year, unless there is a wholly unexpected advance in the prices of farm products, it can be accepted as certain that most of the cars sold will be in the lower price brackets.**

While there are a good many used cars in the hands of dealers, this situation is not as serious as had been expected. It will become serious very rapidly, however, if there is any general slowing up in business and a consequent restriction in employment. Many of the cars which have been sold on time then would be repossessed by finance companies and dealers. This would make it difficult for dealers to press so energetically the sale of new cars.

Production for the first six months approximated 1,825,000 passenger cars and 200,000 trucks. If output were continued at this rate for the second half it would mean 3,600,000 passenger cars and 400,000 trucks, a total of 4,000,000 which obviously is impossible. Any estimate of what the rest of the year will bring is merest guesswork but it is difficult to see how the total can fall far short of 3,000,000. It will reach that figure even if production for the next six months is only half what it has been for the first six.

**So far as the course of events for the rest of 1923 can be foreseen now, there is nothing in the portents to cause alarm or even serious concern for manufacturers in the automotive field who watch their steps, limit production to demand, keep their assets liquid and refrain from building up unwieldy inventories. For the most part they have conducted their operations wisely for the last eighteen months and there is every reason to believe they will continue to do so. If they do they have nothing to fear and the year will show substantial profits.**

## Electric Steel Founders Announce New Trade Practices

**T**HE Electric Steel Founders' Research Group has recently adopted the following trade practices:

1. Suitable pattern equipment for economical molding shall be furnished by customer.
2. The foundry will not be responsible for correctness of pattern equipment to blueprint, except when such equipment is made for the customer under the supervision of the foundry.
3. Repairs on pattern equipment shall be paid for by the customer, except when occasioned by carelessness on the part of the foundry.
4. Patterns must have distinctive colors to identify separately the core-prints, machined surfaces, and rough casting.
5. All patterns, coreboxes, and loose pieces thereof, must be properly numbered for identification.
6. All transportation charges on pattern equipment to and from foundry shall be paid by the customer.
7. The foundry will not carry insurance on customers' pattern equipment.
8. Free replacement will be made of defective

castings if reported and returned to foundry within a reasonable time.

9. The foundry will not be responsible for any expense on defective castings incurred by the customer.
10. The customer will be charged with the cost of molds and cores discarded by the foundry due to change in patterns or coreboxes.

**A**FRENCH inventor has taken out a patent for an electric vehicle, the battery of which can be readily recharged from a source of multiphase electric currents rectified by means of its own motor.

Supposing the triphase system to be in general use, the electric motor is provided with three collector rings, connected to three equidistant points of its armature winding. The motor, moreover, drives the car through a friction clutch, and when it is desired to charge the battery the clutch is thrown out and the alternating current line connected to the alternating current terminals of the motor, which will then act as a converter, the armature being set in rotation by the multiphase currents and direct current collected at the commutator for charging the battery.



# Unit Body and Chassis Construction Features British Lagonda

Lower production cost and greater rigidity are advantages claimed for design. Frames formed from sheet steel and angle stock. Wood used only for floorboards and blocks to which upholstery is fastened. Vehicle has orthodox appearance.

By M. W. Bourdon

**T**HE Lagonda, a British light car, embodies a system of construction believed to be unique, for though the new Italian Lancia, introduced last autumn, has a similar arrangement in principle it differs very materially in practice.

The Lagonda Co. makes two main claims for its system, namely, lower cost of chassis and body and far greater rigidity, the latter resulting in freedom from thuds, rattles and creaks due to the flexing of the normal chassis and its effect upon the body. As to the first claim, in the absence of comparative figures, it is impossible to form any opinion; but it can certainly be said that the second is justified, as there is no tendency for the doors to "gape" when the car is driven over bad roads.

Angle steel stock of three sizes ( $1\frac{1}{2}$ ,  $\frac{7}{8}$  and  $\frac{5}{8}$  in.) and sheet steel are used to form the chassis and body frames; there are only a few sheet pressings of quite a simple nature. The latter, as well as the small number of flat stampings from sheet, are formed in three presses in a corner of the plant and are all made from  $\frac{1}{8}$ -in. stock.

Each of the main side members of the chassis is formed of two lengths of  $1\frac{1}{2}$ -in. angle steel, the upper one straight in elevation, while the lower is set at two points so as to afford a girder-like construction when it is united by plate brackets to the upper unit. Each frame side is subsequently completed by a vertical filling-in plate running the full length and riveted to the angle steels.

The side members with their sheet pressings and with the brackets that unite them at the front and center, but without the filling-in plates, are shown in Fig. 1. This view also shows the dummy power unit around which

the frame is built up with the aid of templates and jigs.

The cross member at the rear end of the power plant is cut out at the center and drilled to accord with holes in a flange integral with the casing of the gearset. This forms the rear-end support for the power plant. A forward extension of the crankcase rests upon the plate joining the lower units of the side members in front. Here it should be mentioned that the suspension system consists of a transverse and inverted half-elliptic spring in front and a pair of quarter-elliptics at the rear, the frame anchorage for the front spring being the ex-

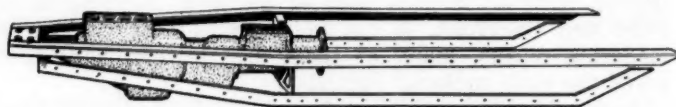


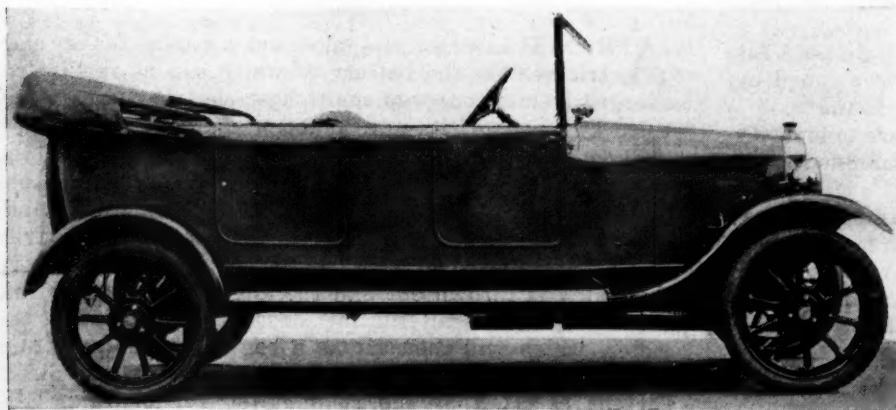
Fig. 1—Frame members of Lagonda car and dummy powerplant to which it is fitted

tensions and uniting plate of the upper units of the side members seen in Fig. 1.

In successive operations various other units of angle steel and plate are either riveted, spot-welded or screwed to the side members and to each other. Riveting is preferred to welding or bolting; screws are used only where practical considerations rule out the other forms of joint. The brackets for the rear spring butts and those for the running boards are hot-riveted; cold riveting is adopted elsewhere.

Fig. 2 shows a chassis and body framing at a later stage of completion, though here again the filling-in strip of the side members has still to be fitted. This view shows the skeleton of a two-seated car with a double dickey. The panels used on this model, as well as all except one of those on the four-seater, are shaped by rolling; the rear panel of the latter is a pressed and hammered sheet, for it has both a horizontal and a vertical curvature.

The body panels are of 22-gage steel and are riveted in place. Both these and the body framing are more or less depended upon to stiffen the upper part of the car, the construction preventing any semblance of relative movement. The only wood in the completed body is that used for the floorboards and to form blocks to which the upholstery is attached. These upholstery blocks are secured



Lagonda four-seater



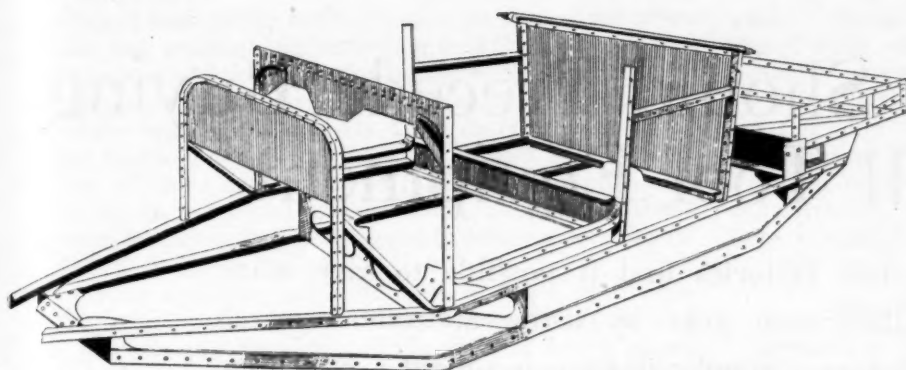


Fig. 2—Lagonda frame in a more advanced stage of manufacture

to the framing by 3/16-in. screws passing into threaded holes in thickened sections of the framing, the normal thickness being increased at these points by backing plates spot-welded in position. The door hinges are secured to the posts and door frames in a similar way.

Three distinct models are made—two-seater, four-seater and coupé—with the same chassis frame serving for all.

There is nothing unconventional about the appearance of the complete cars, which are quite in keeping with British light cars in general in respect of dimensions, outline and finish. The plant is not a large one even on British standards, being capable of producing fifty cars a week, every component being made under the one roof, including the power plant (four-cylinders, 2 3/4 by 3 3/4 in.), axles and steering gear.

The following are a few leading particulars: Wheel-base, 108 in.; track, 46 1/2 in.; weight of four-seater with 28 x 3 1/2-in. wheels and tires, 1570 lb. With its folding top and "all-weather" side panelling the price of the four-passenger model is £325.

## New Device Measures Volume of Highway Traffic

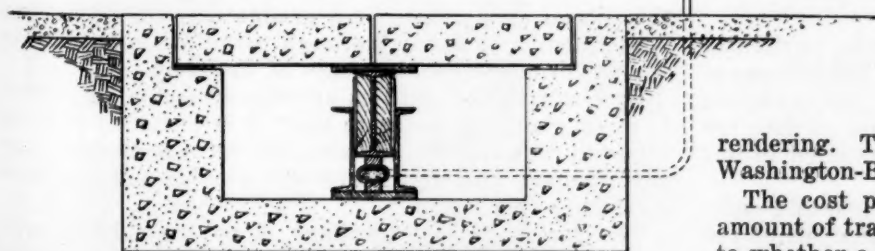
A NEW device which will answer a multitude of questions—directly and indirectly—about automotive traffic on highways has just been invented by the engineers of the U. S. Public Bureau of Roads and will be used in their surveys.

Stated briefly, the new device—patents on which are now pending by the Government—may be installed on a highway and will make an automatic record of the number and weight of vehicles passing over it as well as the speed.

One of the prime requirements, in the construction of new roads, is knowledge as to the amount of probable traffic and the kind, in order that the most economical road construction may be done. The new device will answer this question, along with many others.

It is believed the answer may be found also to the mooted question of snow removal on public highways in the northern states, in order that automobiles may use the highways the year around. By figuring the amount of traffic over a given road and multiplying the cost per ton mile per gallon of gasoline, the governmental engineers can determine whether or not it would pay to keep certain interstate roads clear during the winter months.

The apparatus consists of a rubber hose, filled with water or oil, which is placed beneath the pavement in such a way that the weight of a vehicle passing over it is transmitted to a chart. A small tube runs from the hose to a standard pressure recording device. A passing vehicle compresses the oil in the hose and the pressure is transmitted through to the recording device. There the pressure actuates a lever which makes a record on a cylindrical roll of paper and also actuates an attachment for moving the paper.



Sectional view of traffic recording instrument

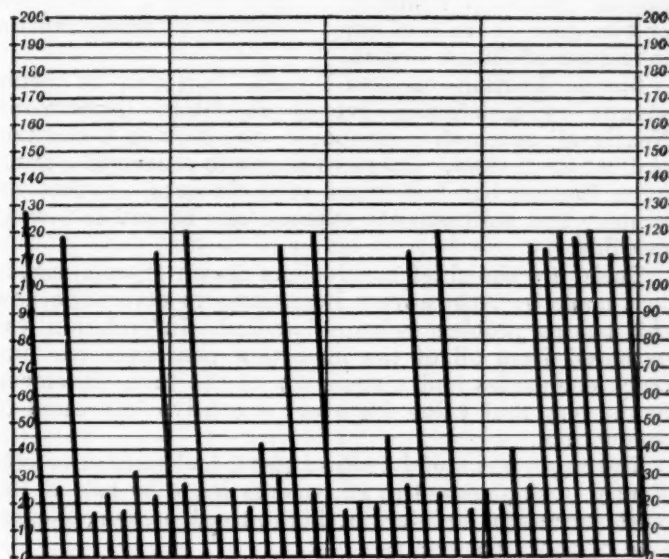


Chart of vehicular traffic recorded by Bureau of Roads measuring device

The record shows the weight of both front and rear wheels of all vehicles which have passed over the road, the short line indicating the front wheels and the long line the rear ones. The instrument also shows the time, thus giving the peak of the traffic.

By use of the instrument road builders can compare the wearing qualities of different types of road under actual traffic and determine the service a road is rendering. The first instrument has been installed on the Washington-Baltimore turnpike and is satisfactory.

The cost per ton-mile multiplied by the weight and amount of traffic, they figure, will answer the question as to whether a new road should be earth, gravel, concrete or bitulithic construction.

# Careful Test Should Precede Buying of Small Tool Equipment

Important automotive factories find it possible to save many thousands of dollars each year by using accurate research as basis for purchasing. Standardization is sought. Executive responsible for selection varies widely from plant to plant.

**M**ETHODS of buying small tools differ widely in automotive plants. Responsibility for determining the tools to be purchased rests on a variety of officials ranging all the way from the tool room foreman and the stock keeper to the purchasing agent and the production manager. Some factories consider the selection of small tools one of their most important buying problems, while others are inclined to find one or two good sources of supply and let a formal routine take care of future orders.

Standardization of small tools, however, is being sought by practically every production department. Nearly all automotive companies are seeking a common end in this respect. They are trying to reduce to a minimum the number and types of tools used, so that inventory and maintenance expense can be cut as low as possible.

These are the chief conclusions drawn from a survey just made by AUTOMOTIVE INDUSTRIES to determine how this buying problem is being handled. Information was gathered from all of the important passenger car and truck companies and a summary of the facts developed has a very real value for every executive interested in production.

The importance of handling small tool purchases efficiently is emphasized in statements made by two of the most successful builders of high-priced passenger cars. One of these companies says:

"We do not regard the purchase of small tools as of minor consequence. On the contrary, we take extreme precautions in selecting and inspecting them in order to insure the greatest efficiency. We would lose much more money in a season's production if they were not of high quality than we would if we purchased a machine tool of inferior quality or design.

## Large Sums Saved by Analyzing Problem

"To put it differently, the yearly expense involved in the consumption of these small tools amounts to several hundred thousand dollars in our company, whereas the actual depreciation of all machinery in our plants probably is not one-tenth of that amount."

The other big producer says: "We take particular pride in the fact that the specifications of miscellaneous tools and small tool equipment receive just as close scrutiny as regards quality and performance as does the most elaborate machine tool equipment installed in our plant."

These two examples indicate that considerable sums of money can be saved through a proper analysis of the small tool problem. Nearly every plant recognizes this to a greater or less extent, but room for improvement

seems to exist in a good many organizations. Some companies of reasonable size, for instance, do not have any special method of selecting small tool equipment, while a number of others regard it as a routine affair, rather than as an important production problem, solution of which may be the means of saving or wasting a good many dollars.

Nearly all automotive factories have some provision for testing small tools in production before buying them in large quantities. Such tests are made at regular intervals in some places, while in others they are made when the necessity for them arises. The difference in practice, however, lies chiefly in the methods used in making and recording the results of such tests.

Special men are delegated to this task in some factories and spend practically their entire time testing and experimenting. Results of these investigations are analyzed and the tools to be bought are specified as a result. Under such circumstances the purchasing agent frequently is required to buy the make of tool specified by the testing department.

## Special Men for Tool Testing

Specific records of tests are kept in many other plants, although the experimental work is carried on by the tool room foreman, the production manager or some department head in connection with his other duties. Where these tests are carefully recorded, so as to permit a comprehensive study of results, the purchasing agent usually has to act on the recommendation of the executive in charge of the tests.

Even in those instances where the stock clerk or some similar man is responsible for small tool requisitions and where general watchfulness supplants detailed tests, the purchasing agent usually buys in accordance with the ideas of the man who makes the requisition. In a very few cases the purchasing agent is chiefly responsible for purchase of small tools, although several factories provide the purchasing department with a special man whose sole duty consists of buying equipment of this character. Where this system of organization is used, the special man usually is a graduate of the production department and has a thorough technical knowledge of the performance requirements of the shop.

Special testing facilities are not available, of course, in many plants of moderate size. It is perfectly possible for such factories to keep accurate records of small tool performance, however, which will provide a sound basis for future selection.

The factor of tool breakage is not considered sufficiently in many cases. The loss involved is far greater than the mere cost of the tools. Careless operators are



not always responsible for tool losses, as the causes often include bad castings, defective jig or fixture equipment, or the location of the operation on the wrong machine.

A great fund of useful information and important economies will result directly from daily inspection of broken tools. Such tools should be tagged with a brief history of their individual performance, covering machine, set-up, operation and operator. Analysis of these histories by an executive will quickly discover weak spots in tooling, labor or design.

A strong tendency exists in certain parts of the industry to get one or two reliable sources of supply and then let well enough alone. This practice has a sound basis in many cases and is continued partly because of the desire for standardization of small tool equipment and partly because supply sources naturally are inclined to favor steady buyers in both price and service.

Most factories, however, are looking for new tools which will do a job better than it is being done at present. They are inclined to put the burden of proof on the man selling the new equipment, however, provided the present tools are doing a reasonably satisfactory job.

#### Standardization of Makes and Sizes

The trend toward standardization of makes as well as of sizes is shown by the statements from various sources. One company says:

"We have to a large extent standardized on two or three makes of drills, taps, hacksaws, etc., and therefore when the stock clerk sends requisitions for any of these small tools to the purchasing department we specify on our orders the make of tools which we have found to answer our requirements to the best advantage."

Another one states: "By cooperation between the purchasing department and our tool supervisor we have developed the best make of tools for each operation and, as a rule, have discovered that two or three makes are usually about the same quality for each job. Therefore,

when a requisition is received for tools, the order is placed with one of these companies."

Nearly every plant has some definite provisions, however, for testing equipment and is usually glad to try out anything that appears to have merit. In one big organization "the quality of small tools is determined by comparative tests conducted by the tool supervision department." Another "through tests decides on what they consider to be the best sources on drills, taps, reamers, etc."

#### Quality More Important Than Price

Analysis of the causes of failure serves as a basis for buying small tools in a well-known truck factory, while a big tractor company "carries on at different times exhaustive tests on the majority of small tools required." A high-priced passenger car organization determines specifications for small tools "by actual tests," while a big producer in the medium price class, "after very exhaustive research work, has standardized on certain makes that have proven beyond all doubt to be the cheapest tool per automobile built."

The more successful car builders all emphasize the necessity for quality in small tools and consider that characteristic of far more importance than price. They conduct their tests to determine the cost of a given tool per unit of work, realizing that this is the real price that has to be paid.

While the selection and purchase of small tools has been studied carefully and organized efficiently in many factories, a general survey indicates that there is a chance for improvement in numerous cases. Habit probably influences tool selection too strongly in some instances, while in others accurate tests or performance are not readily available to be used as a basis for buying. Each unit of this kind is relatively small, but the large number used in a year by the average plant makes small tool equipment worth careful attention.

## Substitutes Pressed Steel for Die Castings in Body Hardware

PRESSED steel has been substituted for the usual die casting in three articles of body hardware which have recently been announced by the Ternstedt Manufacturing Company.

A simple door bumper as illustrated by Fig. 1, consists of a pressed steel carrier which is imbedded and held in the door sill by a single No. 7 flat-head wood screw. A molded rubber cushion is retained by ribs which are formed in the carrier which is parkerized to prevent rusting. This design was originated for low priced body construction but is also suitable for closed body work.

A more expensive dovetail construction is illustrated in

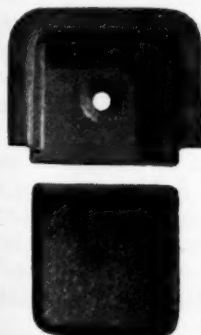


Fig. 1

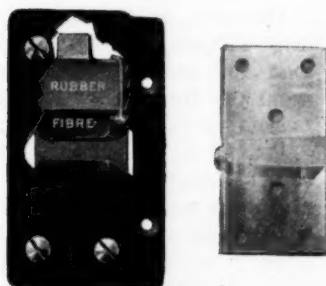


Fig. 2

Fig. 2, which accommodates the rubber bumper, bumper shoes and wedge plates of a former model. This design is made of a galvanized stamping which is imbedded in the body pillar and carries the fiber shoes backed up by rubber cushions. The wedge plate is sunk in the pillar of the door as usual.

Fig. 3 illustrates a stamped construction as applied to the end post of a curtain roller. This construction is somewhat lighter and considerably cheaper than the usual die casting. As the visible surface is smooth and highly polished, application to closed cars of all price ranges is feasible.



Fig. 3

A LOW-PRICED, light-weight tractor has been recently introduced by the Saunderson Tractor & Implements Co., Ltd., of Bedford, England, according to advices to the Agricultural Implement Division, Department of Commerce.

This tractor has been designed with a view to meeting the conditions affecting the sale of tractors abroad. It sells for £195, is said to be economical in the use of fuel, and to facilitate the employment of unskilled labor.



# Piston Displacement Factors Found for Motor Trucks

Relation to vehicle loaded weight, driving wheel diameter and direct gear drive ratio discussed. Analysis follows lines of similar study previously made for passenger cars. Trucks are divided into four separate groups on rated tonnage basis.

By P. M. Heldt

**A**BOUT two years ago the writer made an analysis of the piston displacement in passenger cars corresponding to a ton-foot of transportation, and after this had appeared it was suggested that a similar analysis be made of the same relationship in commercial vehicles. Data have therefore been gathered from a large number of the leading makers of motor trucks, and from these data piston displacement per ton-foot has been calculated.

It was shown in the previous article that if  $W$  represents the weight of the loaded truck in pounds;  $d$ , the wheel diameter in inches;  $D$ , the piston displacement of the engine in cubic inches, and  $r$ , the gear ratio between engine and driving wheels on high gear, then the piston displacement factor,  $F$ , is given by the formula

$$F = \frac{3825 r D}{W d} \text{ cu. in. per ton-ft.}$$

The value of the factor resides in the fact that it constitutes an approximate index of the relative loading of the engine in high gear operation. With road resistance conditions and chassis losses constant, the performance of a ton-foot of transportation requires a certain amount of energy, and with the thermal efficiency constant, a cubic inch of combustible mixture in an engine is capable of developing a certain amount of energy at the crankshaft. By a cubic inch of combustible mixture in this case is meant that volume under atmospheric pressure. Hence, if the cylinders were filled with combustible mixture to atmospheric pressure there should be a definite relation between the piston displacement and the foot-tons of transportation in a given time.

In normal operation, however, the engine cylinders are never filled with charge to atmospheric pressure. If the

piston displacement per ton-foot is great it means that the engine is operated on a relatively smaller throttle opening and that in consequence the charge density in the cylinders at the beginning of the compression stroke is less. In other words, the engine is operating at lighter load. Owing to the fact that with the conventional type of engine the thermal efficiency decreases with the relative load, the greater the piston displacement per ton-foot the lower is likely to be the fuel economy. This relationship is not absolute, because the thermal efficiency depends upon other factors besides the relative filling of the cylinder with charge, or what is known as the volumetric efficiency.

## Main Factor in Fuel Economy

However, in the great majority of truck engines these other factors, such as the compression ratio, are much alike and the relative loading of the engine as expressed by the cubic inches piston displacement per ton-foot is undoubtedly the main factor determining fuel economy. With engines and trucks of similar design it is really the only factor.

The greater the piston displacement per ton-foot the more powerful the truck; that is, the greater the rate at which it can be accelerated and the steeper the hills which it will climb on high gear. Here again it is assumed that all other controlling factors are the same. For instance, with a higher compression ratio it is possible to obtain a greater amount of energy from a cubic inch of combustible mixture, and the piston speed of the engine, combustion chamber wall temperature and other factors also affect the energy liberation.

In the article on passenger cars it was found that the piston displacement factor varied from 24.9 to 47 and averaged 32.8 cu. in. per ton-foot, with a full complement of passengers. The displacement is made rather high because the average passenger car owner likes a snappy car or one capable of a high acceleration. Inasmuch as fuel economy is favored by a low displacement per ton-foot and economy is such an important factor in the operation of commercial vehicles, it would be expected that this ratio would be lower in that type than in passenger vehicles, and so it actually is if the full load condition is considered.

However, in commercial vehicles, especially those of the larger types, there is a vast difference between the full load and empty weight, and the average piston displacement per ton-foot of empty trucks is greater than that of passenger cars.

It was to be expected that the piston displacement per ton-foot would be different for trucks of different capacity, and such was found to be the case when the loaded condition was made the basis of the investigation. Consequently a table has been prepared for trucks of each capacity and the cubic in. foot-ton ratios for each class have been averaged.

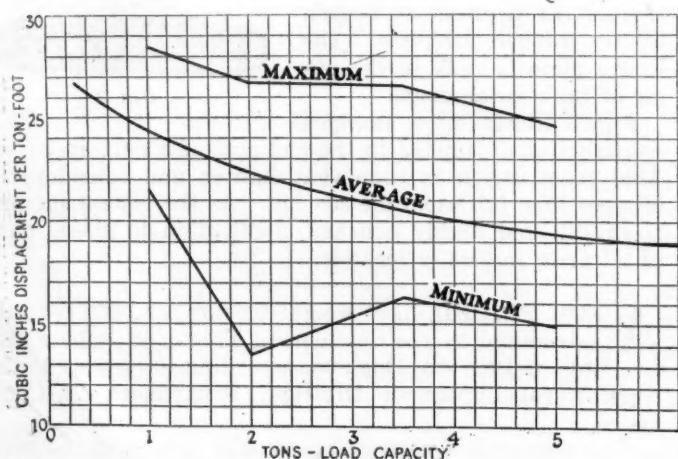


Chart showing maximum, minimum and average piston displacement factors for trucks of varying capacities

The values which have thus been found for the displacement factor may be made use of in determining the proper piston displacement for a truck of given capacity if the total loaded weight, the gear ratio and the wheel diameter are known—

$$D = F \frac{W d}{3825 r} ,$$

$$r = F \frac{W d}{3825 D},$$

where the value of  $F$  is 24.4 for 1-ton, 23.3 for 1½-ton, 22.3 for 2-ton, 20.8 for 3½-ton and 19.4 for 5-ton trucks. The term "proper" is here used in the sense of in accordance with average practice.

1 Ton Trucks								2 Ton Trucks							
Truck	Total Weight	Gear Ratio	Wheel Dia.	No. of Cylds.	Bore & Stroke	Piston Displacement	Displacement Factor	Truck	Total Weight	Gear Ratio	Wheel Dia.	No. of Cylds.	Bore & Stroke	Piston Displacement	Displacement Factor
A ....	6700	5.625	34	4	3 3/4 x 5 1/2	226.4	21.4	O ....	11000	8.3	34	2	4 3/4 x 4 1/2	159	13.5
B ....	5550	5.1	36	4	3 3/4 x 5	220.9	21.5	P ....	10750	6.99	36	4	4 1/4 x 5	283.7	19.6
C ....	7050	6.2	36	4	3 3/4 x 5 1/4	231.9	21.6	Q ....	11075	7.25	36	4	4 x 5 1/2	276.4	19.8
D ....	6430	6	34	4	3 1/2 x 5 1/2	211.6	22.2	R ....	10800	7.25	36	4	4 1/8 x 5 1/2	302	21.5
E ....	6300	5 1/8	33	4	4 x 5	251.3	23.7	S ....	11150	8.4	36	4	4 1/2 x 5 1/4	280.6	22.5
F ....	6400	6 1/9	34	4	3 3/4 x 5	220.9	23.7	T ....	10050	9	34	4	3 3/4 x 5 1/4	231.9	23.3
G ....	5200	5.1	34	4	3 3/4 x 5	220.9	24.4	U ....	9100	7.6	36	4	4 x 5 1/4	263.8	23.4
H ....	5850	5.6	33	4	3 3/4 x 5	220.9	24.5	V ....	10000	8	36	4	4 x 5 1/2	276.4	23.4
I ....	5900	7	35	4	3 1/2 x 5	192.4	24.9	W ...	11300	8.66	34	4	4 1/2 x 5 1/4	280.6	24.2
J ....	5550	5.2	32	4	3 3/4 x 5 1/8	226.4	25.6	X ....	10400	7.75	36	4	4 1/4 x 5 1/2	312	24.7
K ....	5450	6 6/7	35	4	3 1/2 x 5	192.4	26.3	Y ....	9300	7.75	34	4	4 x 5 1/4	263.8	24.8
L ....	6100	6 1/9	34	4	3 3/4 x 5 1/4	231.9	26.1	Z ....	11700	8.66	36	4	4 1/4 x 6	340.4	26.8
M ...	6400	6 3/4	34	4	3 3/4 x 5	220.9	26.2								
N ....	5900	6.75	34	4	3 3/4 x 5	220.9	28.5								
Aver. 24.35								Aver. 22.3							
3 1/2 Ton Trucks								5 Ton Trucks							
Truck	Total Weight	Gear Ratio	Wheel Dia.	No. of Cylds.	Bore & Stroke	Piston Displacement	Displacement Factor	Truck	Total Weight	Gear Ratio	Wheel Dia.	No. of Cylds.	Bore & Stroke	Piston Displacement	Displacement Factor
AA...	17750	8.75	36	4	4 1/4 x 5 1/2	312	16.3	QQ....	22000	9.9	36	4	4 1/4 x 5 1/2	312	14.9
BB....	18575	8.75	36	4	4 1/2 x 5 1/2	350	17.6	RR....	25800	10.25	40	4	4 3/4 x 6	425	16.1
CC....	13700	8.15	40	4	4 1/4 x 5 1/2	312	17.8	SS....	23750	10.25	40	4	4 1/2 x 6	381.6	16.2
DD....	15850	8.75	36	4	4 1/4 x 5 1/2	312	18.3	TT....	21525	10	40	4	4 1/2 x 6	381.6	16.9
EE....	17450	8.75	40	4	4 1/2 x 6	381.6	18.3	UU....	21500	8.31	40	4	5 x 6	471.2	17.4
FF....	18250	7.54	40	4	5 x 6	471.2	18.6	VV....	21900	9.5	40	4	4 3/4 x 6	425	17.6
GG....	18000	10.33	40	4	4 1/2 x 5 1/2	350	19.2	WW...	20625	11.66	40	4	4 1/2 x 5 1/2	350	18.9
HH....	16550	9.25	40	4	4 1/2 x 6	381.6	20.4	XX....	21200	10.25	40	4	4 3/4 x 6	425	19.6
II....	17980	10.25	36	4	4 1/2 x 5 1/2	350	21.2	YY....	24000	11 2/3	40	4	4 3/4 x 6	425.3	19.8
JJ....	15350	9	36	4	4 1/2 x 5 1/2	350	21.8	ZZ....	21675	10.66	40	4	5 x 5 1/2	431.9	20.3
KK....	15300	10.3	40	4	4 1/4 x 6	340.4	21.9	AAA..	19000	10	36	4	4 1/2 x 6	381.6	21.3
LL....	16950	10.25	36	4	4 1/2 x 5 1/2	350	22.5	BBB..	21200	10.25	40	4	5 x 5	471.2	21.8
MM....	16485	10.33	36	4	4 1/2 x 5 1/2	350	23.3	CCC..	21200	11.66	40	4	4 3/4 x 6	425	22.3
NN....	14350	9.25	36	4	4 1/2 x 5 1/2	350	24.0	DDD..	20500	10.33	36	4	4 3/4 x 6	425	22.7
OO....	15900	10.33	36	4	4 1/2 x 5 1/2	350	24.2	EEE..	20700	14	40	4	4 1/2 x 6	381.6	24.7
PP....	15350	10.1	36	4	4 1/2 x 6	381.6	26.7								
Aver. 20.8								Aver. 19.4							



# Aerial Express Service Will Demand Special Plane Designs

Convertible passenger machines do not meet all requirements. Maximum carrying space must be provided. Location of pilot is important question, but place in rear seems to have most advantages. Plywood best material for body construction.

By Archibald Black

**T**HE freight carrying airplane, strictly speaking, has not yet come into existence, as those machines which are now being used for such purposes were designed primarily for passenger carrying and were made convertible so that they could also be used for freight work. The carrying of urgent packages at a higher rate than by other means of transport, is a phase of commercial aviation which is growing steadily and is undoubtedly destined to become a very profitable and important branch of the business in future.

While our passenger machines can be converted into freighters fairly well, each type presents certain special requirements which can be best met if the machine is designed for one purpose only. The speed of the freighter can be less than that of the passenger type because competition on the basis of speed is very much less keen with freight than with passengers. Even a very slow airplane would save sufficient time to permit competition with other means of package transport at a higher rate than charged for the latter.

Cargo space might be said to be the one thing that most airplanes have "everything else but." Designers started, some few years ago, with only military requirements in view and these demanded the highest speed and performance possible. The cubic capacity of the body was of little or no importance so that no thought was spent, and no research was carried out, on the problem of increasing the size of the body without excessive increase in resistance.

The steady development of commercial airplanes is changing this, but designers are reluctant to modify their fixed ideas of body sizes unless very cautiously.

Airplanes used in transporting packages are being called upon to carry a most varied assortment, including such items as millinery which weighs little but occupies considerable volume when boxed. A compartment designed to carry the light bulky items may, by some forethought in construction be just as easily used to carry the heavier ones also. Consequently, the space should be sufficient to accommodate the bulky matter and the floor and ends sufficiently strong to carry the load of the heavier packages.

## Variation in Shipping Weights

The accompanying table gives the weights per cubic foot for a list of packages selected at random and may be regarded as typical of the variations to be expected in shipments. Averaging this, or any other list gives but little additional information, as each individual load may vary greatly from the figure thus obtained. The best practice would appear to be that of making the compartment as large as the body will permit. There is little or no danger of making it too large, the chief difficulty usually being in providing sufficient space without using an excessively large body. Such freight compartments should be designed on the basis of allowing at least 1 cu. ft. of space for every 6 to 7 lb. of pay load, which is about the same as that provided by the latest designs.

In the preliminary layout of the design it is advisable to try placing the pilot in each of the two positions, in front of and behind the freight hold. With the pilot forward, it is usually a simple matter to provide excellent visibility, whereas this is a serious problem if he is located in the rear. On the other hand, the forward

Weights of Express Packages Selected as Typical of Those Likely to Be Carried by Aerial Express

Package	Lbs. weight per cubic foot rectangular of space required	Package	Lbs. weight per cubic foot rectangular of space required
Man's hat, in paper box, wrapped.....	2.5	Newspapers, tied in small bundles.....	23
Bicycle, in crate with open sides.....	4.5	Letter mail, packed tight in large compartment	25
Estimated average of Parcel Post smaller matter	6 to 7	Checks, documents, etc., small bundles.....	31
Suit of man's clothes, in paper box, wrapped...	9	Books, in corrugated paper packages.....	31
Miscellaneous clothing in paper wrapping.....	10	Camera, wrapped in excelsior and paper.....	31
Travelling bag, with average contents.....	10	Typewriter, in wood box.....	32
News matrices, in corrugated paper boxes.....	10	Candy, in paper box, wrapped.....	32
Stationery, in cardboard boxes, wrapped.....	14	Advertising stereo. plates, in corrugated paper	
Cigarettes, in cartons, wrapped.....	18	box .....	62
Letter mail, packed in small, irregular spaces..	20		



position of the pilot greatly interferes with the design of the freight compartment, making it difficult—if not impossible—to locate it very close to the line of center of gravity, while also providing sufficient capacity. This position also tends to break up the arrangement of the hold, sometimes requiring its division into two or more compartments, and it generally prevents the holding of rectangular form.

Fig. 1 shows a study of a freight airplane body, which illustrates some of these points.

This design is far from satisfactory from the viewpoint of pilot's vision, but it provides large cubic capacity, a compartment almost exactly on the line of center of gravity, ease of packing, and a very safe position for the pilot. The last point is an important one to be considered.

Where the pilot is located well forward, he is liable to suffer serious injuries in what would otherwise be only a minor accident and this gain is worth some sacrifice in vision. In any case, poor vision can be largely offset by

the use of reflecting mirrors arranged to assist the pilot in the blind angles. Such mirrors should be provided with some means of wiping their surfaces free from condensation.

It can be frankly stated that there appears to be a very general difference in opinions as to the relative importance of good vision and safety in an accident. Most recent European commercial types place the pilot in the forward position, but these were designed primarily for passenger transportation. The opinion of the writer is that the rear location offers sufficient advantage in other ways to justify a certain amount of restriction of vision, important though the range of vision is.

The freight hold should be rectangular in shape, if possible, and its ends, as well as floor, should be designed to carry the entire weight of the contents in case of a maneuver making this necessary. The inside floor, walls and roof should be free from obstructions and should be either metal surfaced or designed so that worn surfaces may be replaced easily.

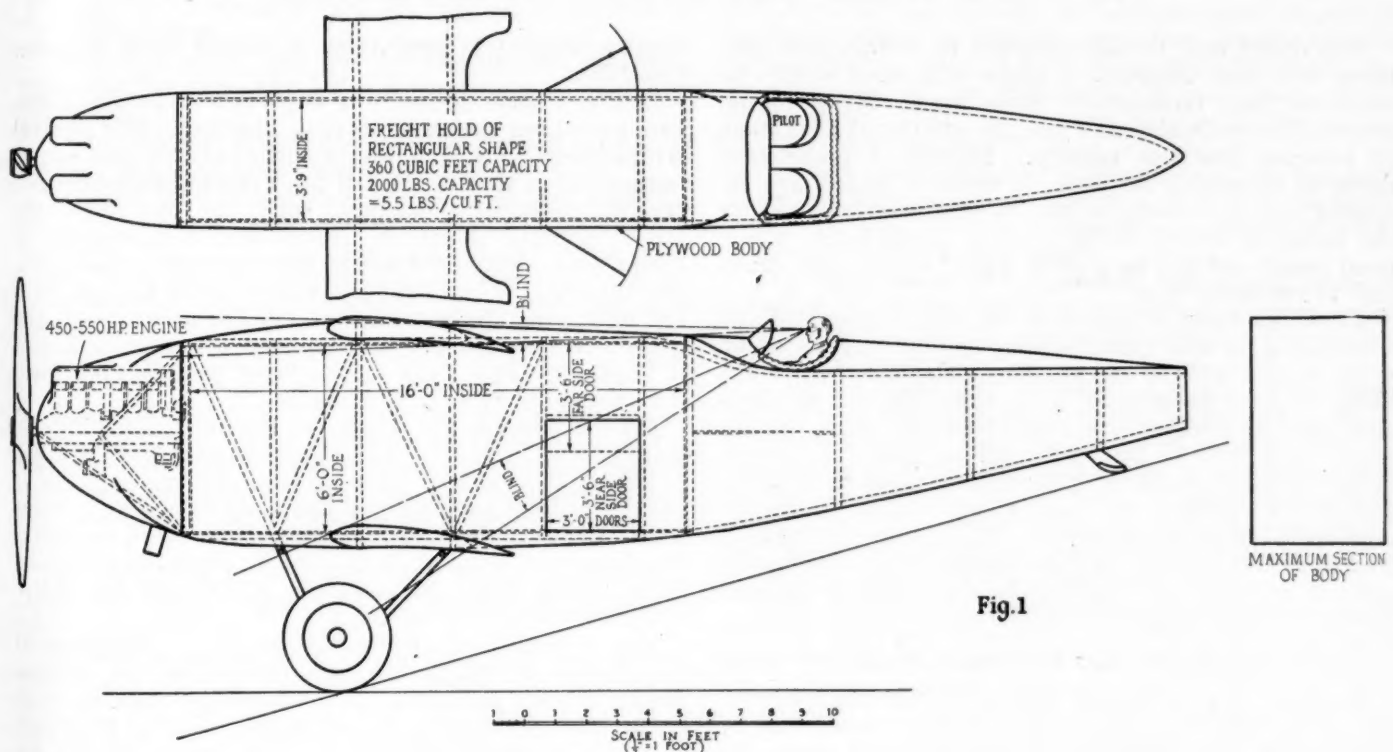


Fig. 1

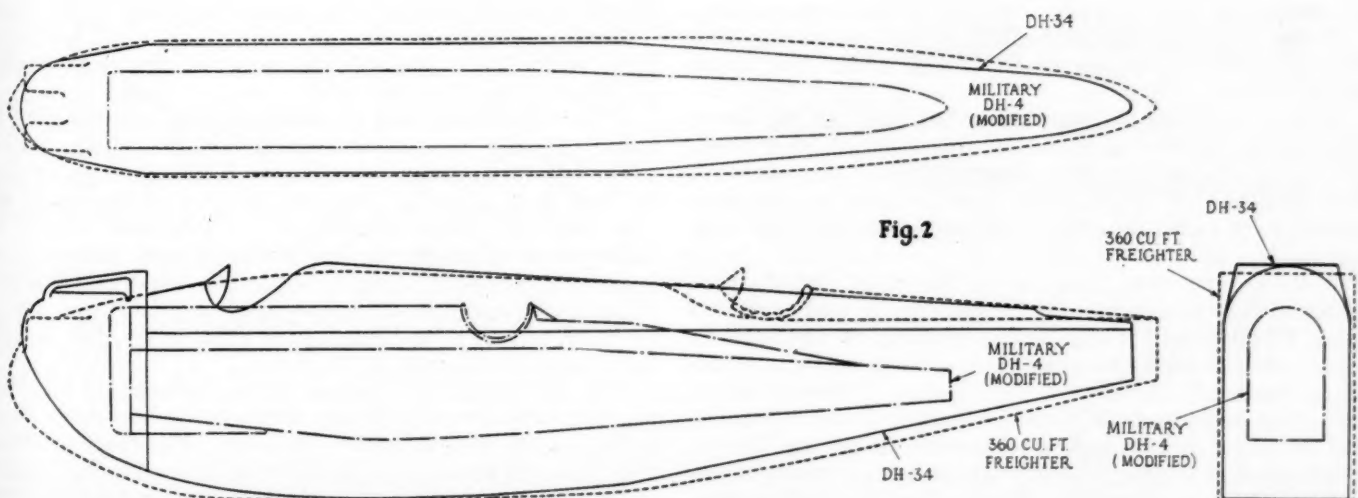


Fig. 2

Fig. 1—Study of body arrangement for freight airplane having extra large cubic capacity. Pilot in rear position. Fig. 2—Comparison of 450-550 hp. freight airplane bodies with DH-4 body



Fig. 3—Loading a Farman "Goliath" at Croydon. (Courtesy of Aero Digest)

This object may be accomplished by lining these surfaces with slats fastened in place with wood screws to facilitate their replacement when worn. Metal lining, however, is preferable and has the additional advantage of reducing fire risk slightly. Plymetl, a proprietary material consisting of plies of wood to which are cemented very thin sheets of steel, is particularly suited for the lining of freight holds. It has considerable structural strain and can be used as a part of the body structure at the same time.

A door, or doors, of liberal size should be provided and should be so located that the compartment may be loaded to the top. In most of the passenger airplanes which are being used for package carrying, the inside of the package space is irregular in shape and the doors do not reach from floor to roof. As can be readily observed, these conditions make it impossible to load to capacity and, if the packages are rectangular, difficult to use the remaining space to advantage. In addition to making poor use of the space, such arrangement does not permit packing properly, so that goods are liable to damage through moving in the hold in transit.

#### Provision for Two Doors Best

Provision of a full height door would introduce serious structural difficulties, but these could be surmounted by carrying the side truss of the body over and under the door somewhat after the manner often used in railroad car design to reinforce the structure below center doors.

Probably a still better method of accomplishing this result would be that shown in Fig. 1, where two doors are provided.

A door is shown on one side of the body at the lower level while the door on the other side is at a higher level, giving access to the full height of the compartment. The provision of only a small door on each side permits retention of sufficient of these sides to transmit the body stresses.

Without question plywood is the most satisfactory material for construction of freight carrier bodies at this time. Whether or not this will eventually be replaced by some other material, such as steel or duralumin, is something that only the future can decide. Plywood offers the great advantage of readily lending itself to carrying stresses in the indirect manner shown in Fig. 1, while also providing a body which is not easily damaged while being loaded. It can also be made watertight so that the machine would float if a forced landing were made on water. Plywood construction can also be

readily adapted to production in either small or large quantities.

In Fig. 1 some of the more important structural members have been shown in order to illustrate their general arrangement. Fig. 2 shows the outline of this body superimposed upon that of the DH-34, a recent passenger and freight, convertible machine, while the outline of the DH-4 (modified model) is also included for purposes of comparison. While the design provides much more capacity than that of the DH-34, it will be noted that its lines are only very slightly larger. On the other hand, the difference between the military and commercial bodies is most striking. Each of the three machines outlined uses about the same size of engine.

A little thought will show the practical difficulties in loading a collection of miscellaneous packages into 250 to 360 cu. ft. of space, not to mention the impossibility of packing all weights, shapes and sizes safely in a short time. In addition to packing difficulties, there is always the danger of some shipments being damaged either by being placed below heavier ones or through the entire contents of the hold sliding around in flight.

Use of containers, which are packed or unpacked at the points of shipment and destination, is general among express companies in the handling of small packages. The application of this system to aerial transport has been suggested by Otto Praeger, former Second Assistant Postmaster General, and its use would be so logical that it is likely to be adopted at some future date.

Small packages of various shapes and sizes are carefully packed into these containers and the packed containers are then handled and loaded as units.

If the containers are of standard size and adapted to closely fit into the hold, the danger of the cargo moving around is eliminated. Indeed, a machine may be dispatched with a partial load, the balance of the space being filled by empty containers. Containers might be light boxes of wood or corrugated board, hampers, or bags, the hampers being possibly the most satisfactory from all viewpoints. If some types of containers are to be used, as seems to be a future probability, the freight hold must be adapted to fit them.

The use of flat, rectangular sides, previously referred to, then becomes mandatory while the doors must be of sufficient size to pass the containers. The body study in Fig. 1 would permit the use of containers having outside dimensions of 3 ft. 9 in. x 3 ft. 0 in. x 2 ft. 0 in. Either sixteen containers of this size, thirty-two of half this size or a combination of a couple of sizes could be used.



# Bureau of Standards Tests Reveal Many Defective Headlamps

Examination of equipment on 400 cars selected at random shows 54 per cent of glaring lights. Bulbs on 73 per cent are found out of focus. Reduction of glare results in better illumination. Great need for education in care and adjustment of headlamps.

By T. S. Sligh, Jr.

Physicist, Bureau of Standards

**F**EW users are getting out of the headlamp equipment of passenger cars all that it is capable of giving them.

There is a real need for general public education regarding the necessity for and the means of adjusting headlamps.

A test screen is simple and inexpensive and in general the required lamp adjustments are easily made.

When an approved device is used, reducing glare invariably results in more and better road illumination.

Safe or legal lighting conditions do not necessarily result from the use of approved devices. Proper adjustment and intelligent care of equipment are also essential.

These are among the conclusions reached in a series of headlight tests planned primarily for the purpose of obtaining information relative to the average condition of headlamps in actual service with the additional object of initiating a campaign of public education regarding proper methods of testing and adjusting such lights, carried out recently at the Bureau of Standards, Washington.

The tests were open to the public and a general invitation was issued requesting that those interested submit their cars for test.

The equipment on over 400 automobiles was tested. These cars were of 58 different makes and were fitted with 47 different types of headlight devices. Thus it will be seen that, although the data are based upon tests of a relatively small number of cars, a good variety was secured. In addition, it must be remembered that the tests were naturally attended by motorists who were really interested in the condition of their headlights, so that the figures may be regarded as optimistic rather than the reverse and probably represent decidedly better than average conditions.

It was also observed that the various percentages established themselves early in the series and were changed but little as new data were worked in.

## Equipment Used for Testing

For these tests a number of canvas screens 6 ft. high by 8 ft. wide were mounted vertically about 25 ft. from a short stretch of level roadway. On these screens a horizontal line was drawn at the average height of the

\*Such a distribution of light, if sufficiently intense as it will be with 21 c.p. lamps and approved headlamps, will give satisfactory driving light and is approximately what is obtained with most approved devices when they are properly adjusted.

There is at present no hard and fast standard pattern; however, light which is more widely distributed than indicated would probably be wasted and might produce glare if it rose above the 36-in. line. A beam much less than 2 ft. in width probably would give insufficient spread down the road.

headlamps, about 36 in. above the level of the roadway. Two vertical lines spaced the distance apart of average headlamp mountings (28 in.) were then drawn. The intersections of these vertical lines with the horizontal line represented the projections of the centers of the lamps to the screen along lines parallel to the surface on which the car was to stand, Fig. 1.

The cars were placed with the plane of the lenses 25 ft. in front of the screen, and data regarding the condition of the headlighting equipment, a summary of which is given in Table I, were taken.

The lamps were then focussed and lenses properly adjusted, if feasible, defects in position of lamp noted, and the driver given a data sheet indicating the condition of the headlamps.

A suitable headlamp, properly adjusted, should throw on a screen set up as indicated a pattern 2 to 2½ ft. high and 7 to 8 ft. long\* as shown in Fig. 1.

Light which strikes the horizontal line on the screen would never reach a level road. Light striking 4 in. below this line reaches the road about 225 ft. ahead, and light striking 18 in. below reaches the road at a distance of 50 ft. from the car.

Light striking the screen 24 in. to the sides of the vertical lines and 9 in. below the horizontal line has a spread of 25 ft. on the road 100 ft. ahead of the car, thus providing gutter lighting.

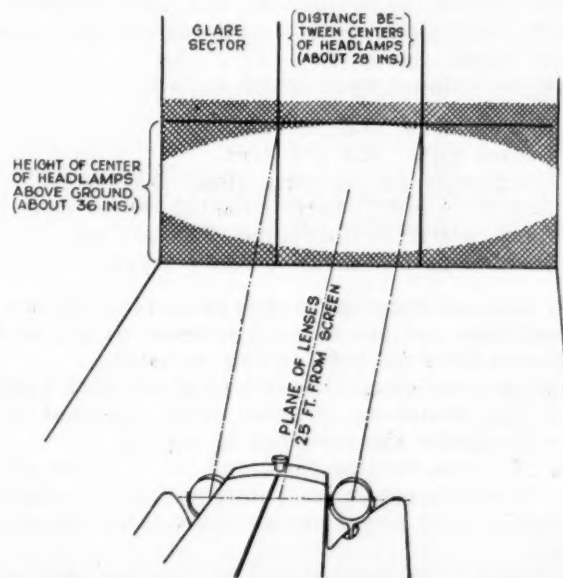


Fig. 1—Diagram of test screen used in Bureau of Standards headlamp tests

Table I

## Resume of Headlight Tests

Percentage of cars having headlights in condition noted.

	Per cent
Equipment in good condition.....	5.5
<i>Lenses</i>	
Dirty .....	52.8
Broken .....	4.3
Loose in headlamp.....	3.8
Twisted in headlamp.....	35.8
<i>Reflectors</i>	
Dirty .....	38.8
Rusty .....	6.7
Dented .....	1.7
<i>Bulbs</i>	
Out of focus.....	73.2
Blackened .....	5.3
Too high candlepower.....	0.5
Too low candlepower.....	6.7
<i>Headlamps</i>	
Not parallel.....	23.6
Not correctly tilted.....	46.7
No outside focus adjustment.....	8.4
Glaring lights.....	54.0

In order to obtain some light above the road as a protection against overhanging limbs, projecting timbers and the like, it is advisable to have the pattern come close to or very slightly above the horizontal line in the center only.

A space on the screen in the upper left hand sector about 9 in. above the horizontal and the same distance to the left of the left hand vertical line intercepts the light which would probably reach the eyes of an approaching driver 100 ft. away. This light, if sufficiently intense, produces glare. Especial care should be taken that the lamp adjustment is such that no part of the principal beam falls within this sector.

## Small Percentage in Good Condition

The resume in Table I shows in percentage the average conditions of the equipment. It is seen that this was in strictly first class condition on only 5.5 per cent of the cars tested.

Large percentages were found as follows:

- Out of focus, 73.2 per cent.
- Lenses dirty, 52.8 per cent.
- Headlamps not correctly tilted, 46.7 per cent.
- Reflectors dirty, rusty or dented, 40 per cent.
- Lens twisted in headlamps, 35.8 per cent.
- Headlamps not parallel, 23.6 per cent.

Dirty lens and reflectors simply reduce the efficiency of the headlamps and are not a dangerous defect so long as sufficient light for safe driving remains.

Headlamps not parallel result in a waste of light, as light which should be directed down the road serves only to illuminate the surrounding scenery.

Lack of focus, twisted lens, and lamps tilted up are conditions which result in a blinding glare in the eyes of an approaching driver and an appreciable loss of road lighting.

Headlamps tilted down illuminate the road for only a short distance ahead of the car and produce a narrow zone of light which may extend only 100 ft. or less ahead

of the car instead of the desired broad zone extending from 40 ft. in front of the car to 250 ft. or more down the road.

It is evident from an inspection of the data that over half of the cars tested had glaring lights and that this condition was due to a lack of proper adjustment. Proper adjustment results in an increased safety and increased road illumination and requires only a few minutes of well directed work. Time spent in checking and adjusting headlights probably offers a better return than could be secured from a similar amount of work on any other part of the car, with the possible exception of brakes. The great need for public education along these lines is evident.

In order to facilitate discussion of data the headlight devices tested have been divided more or less arbitrarily into three general classes as follows:

Class A. Devices recommended for approval by the Motor Vehicle Administrators Conference, May 1, 1923, and includes a few which are approved temporarily, pending final action.

Class B. Devices which are of some value but are not on latest approved list. Some of these have been on previous approved lists.

Class C. Devices which are practically worthless, because they can not be adjusted to eliminate glare without decreasing road illumination below the limit for safe driving.

Of the cars tested 72 per cent were equipped with Class A devices as defined above, 23.8 per cent with Class B devices, and 4.2 per cent with Class C devices. These data indicate the tendency of the motorist to equip his car with approved headlight devices. Approved lists are adopted by various States in an effort to secure safer illumination through the elimination of glare and the provision of adequate road illumination. If we consider the actual condition of the lights as tested it is found that of Class A devices 50.6 per cent have glaring lights, due to improper adjustment, only 7 per cent are in good adjustment, and the remainder are out of adjustment in such ways as to give reduced road illumination but no glare.

Class B devices show 55.5 per cent glaring and 1 per cent in good adjustment and Class C shows 100 per cent glaring.

This indicates that the use of an approved device is only the first step toward securing safe and adequate road illumination. The fact that a smaller percentage of Class A devices are glaring than of Class B and C should not be taken as proof that the Class A devices are necessarily more fool proof than the others. One must take account of the fact that a large percentage of the new cars and practically all of the more expensive cars, which naturally receive better than average attention from the owner or chauffeur, are equipped with this class of headlight device.

## Proper Adjustment of Headlamps a Problem

The problem of securing proper adjustment of headlight devices in use is the second, probably the most important, and certainly the most difficult, step towards safe lighting.

This may be attacked through several channels.

(a) General public education regarding the necessity for and the means of securing proper adjustment of headlights. The tests here described serve this purpose in a small way. The Washington (D. C.) Safety Council plans to secure the erection of a number of test screens carrying simple directions for testing and adjusting headlamps. These screens will be available to the general public.



(b) Enforcement of present laws relating to glaring lights. At present little attention seems to be paid to the *adjustment* of headlamps, and without a preliminary campaign of public education strict enforcement would probably swamp the traffic courts.

In this connection it would seem that traffic regulations might more generally provide for some minimum road illumination consistent with safe driving as well as the maximum now usually specified.

(c) Through manufacturers. Makers of lenses and headlamps could give clear instructions regarding proper adjustment and should emphasize the necessity for observation of same.

Lenses and lens mountings could be so designed as to make proper lens position automatic, i. e., by providing such engagement between lens and lamp housings, not lens housing or rim, that a fit can be secured only when lens is in the correct position.

Some easily operable method of removing lens could be universally provided in order to facilitate cleaning of lens and reflector and replacement of bulb.

External focus adjustment could be provided in all headlamps. Very few people realize that it is necessary to refocus lamps each time a bulb is replaced on account of the slight differences in positions of the filaments in different bulbs and the possibility of accidental change in position of bulb socket during such replacement.

#### Proper Mountings Needed

The lamp assembly could be made such as to positively locate lamp filament reflector and lens with respect to each other and to maintain these relative positions.

Headlamps could be so mounted as to be protected against accidental displacement resulting in misalignment. The probability of such misalignment is obviously increased in cases where lamps are mounted on fenders.

Means of swinging and tilting lamps to permit of

correction of misalignment and adaptation to lenses requiring different degrees of tilt could also be provided.

It is understood that most of the above suggestions are to some extent incorporated in present practice. Their more general adoption seems desirable.

#### Signs Should Be Placed Low

It was observed during these tests that few motorists realized the necessity for adjustment and occasional re-checking of headlamp condition. A large majority hoped to secure better road illumination and a good many had observed that their lights seemed to be emitting a glare which annoyed passing motorists and wished to obtain a lamp setting which would permit them to pass another car safely with their bright lights on.

In this connection it should be noted that the common practice of switching off bright lights in passing another car may be dangerous on a dark road unless the car is being driven very slowly, for it takes the eye an appreciable length of time to adjust itself to the changed condition of illumination and until such adjustment is made the driver is practically blind so far as seeing the road is concerned.

Possibly the usual practice of placing highway signs five feet or more above the roadway has something to do with the common tendency to operate lamps which throw a large amount of light up into the air. It would seem only reasonable to place such signs at a height which would permit of their illumination by properly adjusted headlights. Signs so placed would probably also be sufficiently prominent for daylight traffic.

The ever increasing density of traffic on all of our highways and the consequent great increase in night traffic tend to throw an ever increasing responsibility on proper headlighting equipment. Improvement in this direction will result in increased satisfaction and safety to most of the 12 million drivers in this country.

## Manufacture of German National Fuel Now Explained

PARTICULARS of the manufacture of tetrahydronaphthalene, one of the components of the German national fuel tetraline, are given in an article on "The Industrial Applications of Catalysis in Organic Chemistry" by A. Mailhe in *La Technique Moderne*.

It was first shown by Sabatier and Senderens that by subjecting the vapors of naphthalene to the action of hydrogen in contact with nickel at 390 deg. Fahr., one obtains a product boiling at 403 deg., tetrahydronaphthalene. Some time later Leroux showed that this new product could, in turn, be hydrogenated and then yielded decahydronaphthalene.

In order to make use of these products commercially, it was necessary to solve two problems, namely, the purification of the naphthalene and the transformation of large quantities of the naphthalene into hydrogenated products at a time. These problems were solved by Professor Schroetter of Berlin, the inventor of tetraline. The raw material necessary is produced in immense quantities in the German coke ovens and gas plants.

Professor Schroetter soon realized that the methods of naphthalene purification known up to that time were inadequate in that they failed to remove all of the sulphurous components which the naphthalene contained. He therefore discarded these old methods and investigated processes of purification by means of metals. The great affinity of many metals for sulphurous products is well known. By treating naphthalene either by sodium

at the fusion temperature of that metal, or by iron, copper or nickel in the powdered state, he succeeded in removing all of the sulphur.

The desulphuration problem having been solved, Schroetter applied to the purified naphthalene the hydrogenation process which had proved successful in connection with oils. The melted hydrocarbon is placed in a caldron capable of withstanding high pressures. By permanent agitation it is kept mixed with the catalysing metal, nickel, and the mass is heated to 356 deg. Hydrogen is forced into the caldron under a pressure of from 210 to 280 lb. per sq. in. and the naphthalene immediately changes to a tetrahydrogenated product.

If the hydrogenation is continued for a longer time, a decahydrogenated product is obtained. But this superhydrogenation process consumes more time and is more difficult to carry out. The two products thus obtained are sold on the market under the names of tetraline and decaline and are produced at the rate of hundreds of tons per day at the Rodleben works of the Tetralin Gesellschaft.

Tetraline is chiefly used as a component of motor fuel, the German national fuel being composed of equal parts of tetrahydronaphthalene, benzol and alcohol. It is proposed to use these products also as solvents to replace turpentine in the manufacture of varnishes, etc. The German national fuel is claimed to have 800 more heat units per pound than American light gasoline.

# Analysis of Car Sales in *ILLINOIS* Shows State Lagging

**T**HE accompanying article gives a detailed survey of registration and dealer trends in the State of Illinois. It shows the relation of registration growth in Illinois to that of the United States as a whole and indicates the relative popularity of the various price classes.

Increase in number of dealers is graphically presented, together with an interpretation of the tendencies developed. These data will be useful in analyzing the territory and in attempting to establish proper dealer quotas.

**R**EGISTRATIONS in Illinois are not keeping pace with those of the United States as a whole, despite the fact that there are only 9 persons per car in the State now as against 29 in 1915. The number of cars is growing rapidly as compared with population, but slowly as compared with the average for the country.

Study of the Illinois curve shows, however, that the growth has been quite steady, no sharp rise being evident at any period. It isn't likely, therefore, that the growth line will straighten out for many years to come.

High priced cars seem to find a good market in Illinois,

as in the other big industrial States previously discussed. Both the "\$2,000-\$3,000" and the "\$3,000 and over" classes took a decided jump in percentage of total new car registration in 1922, the former showing a larger proportion of the total than in 1920. The figures show that about 7.5 per cent. of the new cars registered in Illinois in 1922 sold for prices ranging from \$2,000 to \$3,000. This percentage is significant when compared with the production figures for the same year, which show that only 2.3 per cent of the cars built in 1922 were in the \$2,000-\$3,000 price class.

A somewhat similar relation exists in 1922 for the "Over \$3,000" class and the \$1,000-\$2,000 group, although the latter shows a decrease from 1920. The relation of the four price classes in 1922 as regards percentage of new car registration in Illinois and percentage of total production is shown in the following table:

	1922 Percentage of New Car Regis- tration—Illinois	Percentage of Total Production
Under \$1,000 .....	62	77.5
\$1,000-\$2,000 .....	28	18.7
\$2,000-\$3,000 .....	7.5	2.3
Over \$3,000 .....	2.5	1.5

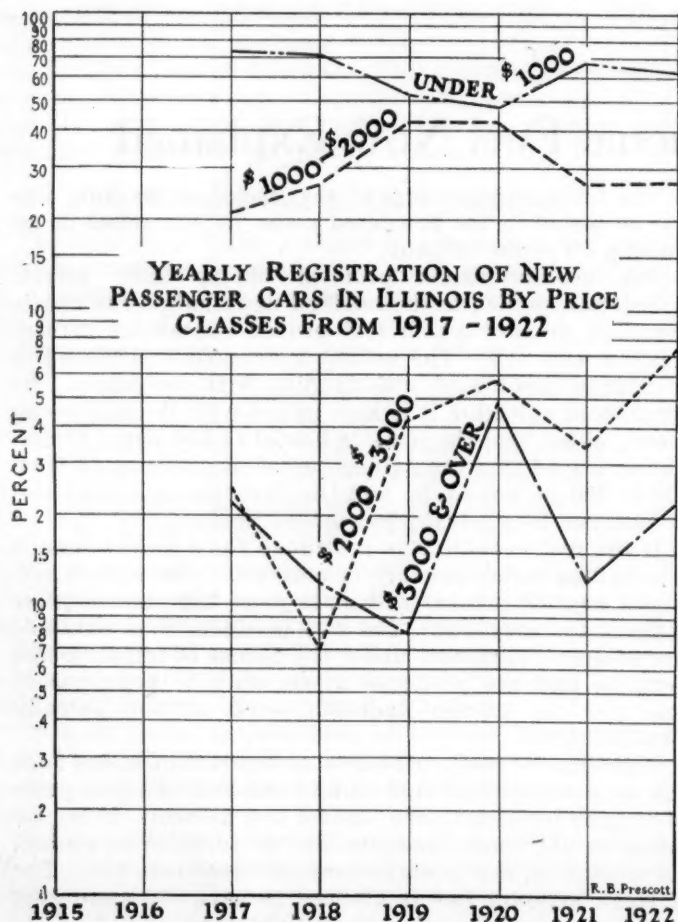
These figures indicate clearly that the higher priced cars are much more popular in Illinois, relatively speaking, than they are generally throughout the country.

Population growth in Illinois is not particularly rapid, which probably accounts for lagging registrations to some extent. Population density has increased from 110 people per square mile in 1915 to 120 per square mile in 1922.

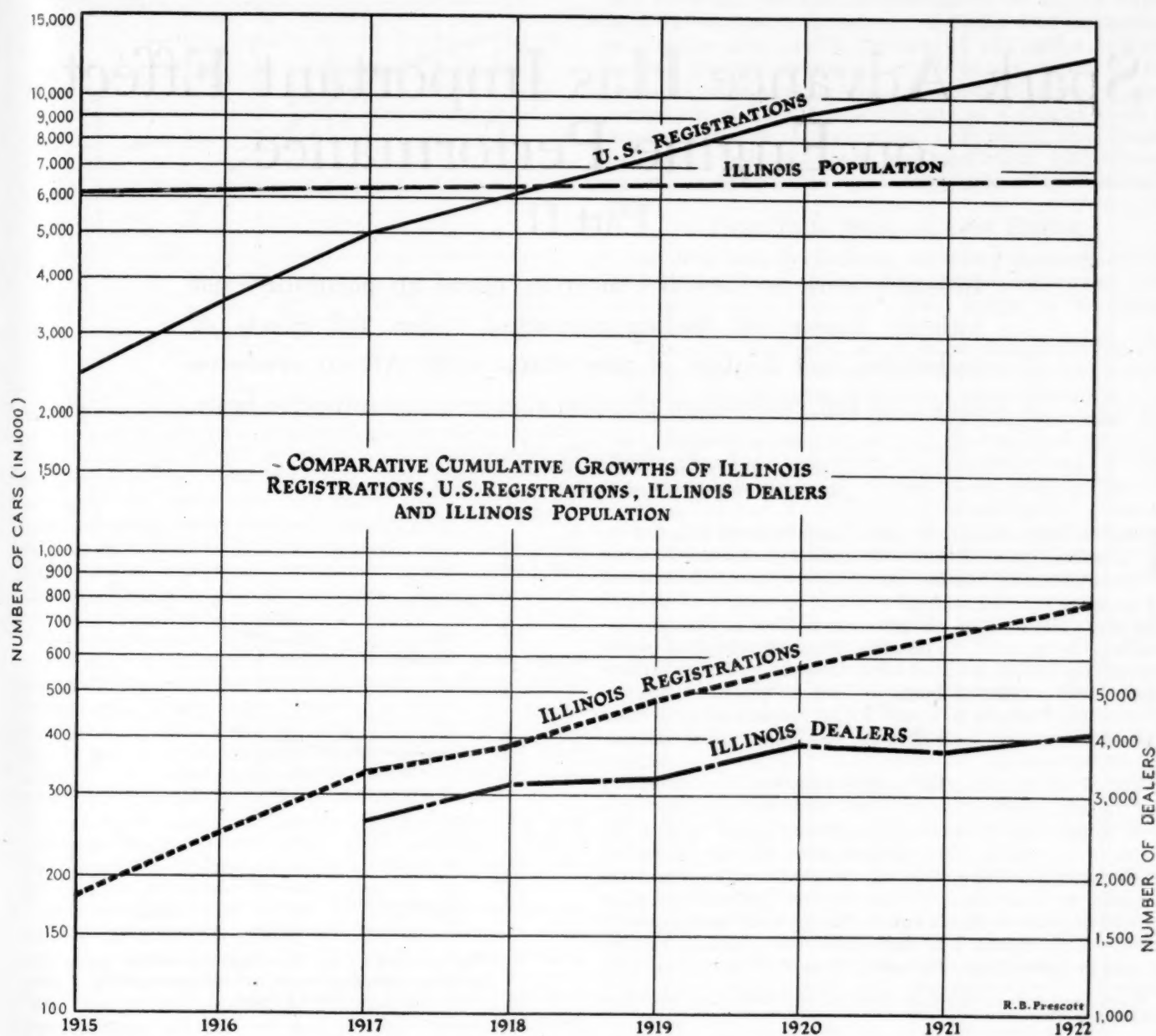
The slow increase in number of dealers probably is another factor in the relatively slow growth of Illinois registrations. This number has increased only 55 per cent over 1917, as compared with an increase of 141 per cent in California and 69 per cent in Pennsylvania. Illinois has equalled or exceeded several other important States in dealer growth, however, among which are Ohio, Iowa and Indiana.

Car registrations have increased 2.4 times as fast as the number of dealers since 1917 and 34 times as fast as population. Illinois registrations have grown only 0.85 times as fast as those of the whole United States.

The number of cars per square mile in Illinois has







increased from 3 in 1915 to 14 in 1922, while the number of cars per dealer has grown from 128 in 1917 to 192 in 1922.

While it is difficult to assign specific reasons for the fact that Illinois has lagged slightly behind the United States as a whole, these statistics indicate that more dealers probably are needed. The number of dealers has increased less than half as rapidly as registrations and no very decided gain has been registered in any year, excepting, perhaps, between 1916 and 1917. The biggest automobile business in the history of the country in 1922 saw a gain in Illinois dealers of only about 200, or approximately 7 per cent. Dealers now in the State number about 4100, as against 3900 in 1920. The number has gone up very slightly in two years despite the fact that registrations have increased about 200,000.

Registration figures in Illinois are in such a confused state for the period preceding 1917 that it is impossible to give a price class analysis before that time. There were 300,000 vehicles running in Illinois before the registration system was developed sufficiently to permit a detailed classification of the cars. This explains the failure of the curves to run back farther than 1917.

Study of the price class curves shows that the higher priced cars benefit materially from periods of business

prosperity. When times are bad, the lowest priced vehicles form a greater proportion of the total sales than during good times. In 1918, 1919 and 1920, for example, cars selling for less than \$1,000 dropped down to a marked extent. The "\$1,000-\$2,000" group almost came up to the low priced group in 1920, the percentages for the two being 40 and 48 respectively. The "2,000-\$3,000" and "over \$3,000" groups both reached the peak of popularity in the same year.

A similar trend is shown by a comparison of the 1921 and 1922 statistics. The "under \$1,000" group went up in 1921, a period of bad business, while the higher priced cars dropped. With the return of prosperity in 1922, however, the relative popularity of the groups changed again to the advantage of the larger vehicles.

It is too early to determine accurately how the 1923 curves will go, but if past results are repeated, it is likely that the curves for the three higher price classes will continue upward, while that for the "under \$1,000" group will drop slightly again. This trend in respect to percentage of total new car sales in Illinois has no relation, of course, to the actual volume of sales. Though the "under \$1,000" cars dropped in proportion to the total in 1922, the actual volume of sales in the group increased materially.

# Spark Advance Has Important Effects on Engine Performance

## Part II

Research work at Cornell University opens up possibility, not hitherto known, of finding numerical values for effects of turbulence and dilution of new charge with exhaust products. May help put combustion chamber design on quantitative basis.

By George B. Upton\*

Professor, Experimental Engineering, Cornell University

I HAVE mentioned previously turbulence as a factor in speeding up combustion. Hopkinson experimented on turbulence with a fan inside of a cylindrical bomb of 12 in. diameter. He used a 1 to 9 mix by volume of coal gas and air. The data of his tests are plotted in Fig. 5. Assuming, as a most simple relation, that speed of flame travel is a linear function of turbulence, we should have flame speed = size of bomb divided by explosion time =  $K(1 + bR)$ , where  $K$  is the reciprocal of explosion time without turbulence, and  $R$  is the revolution speed measuring the turbulence.

Fig. 5 shows that this simple equation is satisfactory for the bomb tests. Later, it will be shown that the same type of equation holds good for an engine;  $R$  is then the r.p.m. of the engine. The constant  $b$  we will call the turbulence factor for the engine, in the engine case. For Hopkinson's fan and bomb the constant  $b$  is 0.0016; in automotive engines  $b$  comes out of the general magnitude of 0.001. This means that turbulence cuts explosion times in two at 1000 r.p.m., divided by 3 at 2000 r.p.m., etc. In

\*Condensed from paper presented at Summer Meeting of Society of Automotive Engineers.

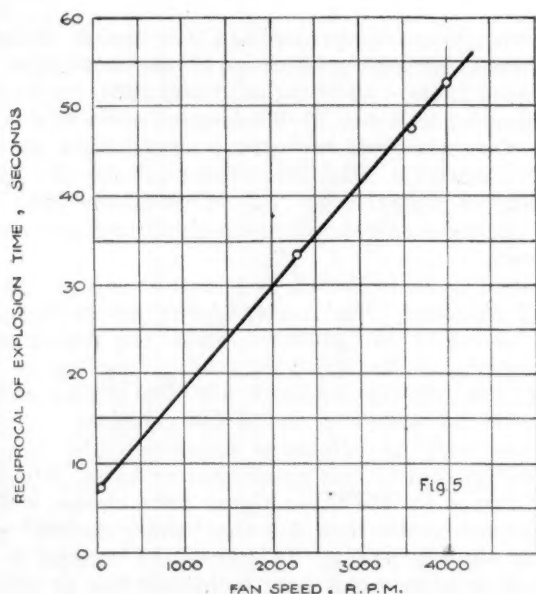


Fig. 5—Relation between explosion time and turbulence determined by Hopkinson using a bomb fitted with a variable speed fan

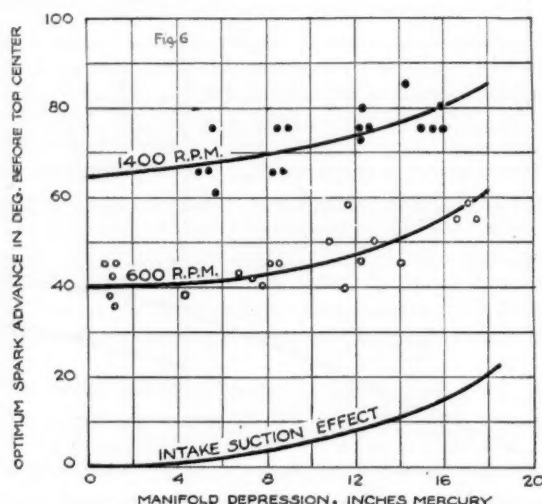


Fig. 6—Effect of manifold depression on optimum spark advance at constant speeds. Ford engine

racings engines explosion times are down to 1/5, and in small cylindered engines, perhaps toward 1/10 the times that would occur without turbulence.

In finding the turbulence factor for a given engine one must first eliminate from the results the dilution factor, the slowing up of combustion by dilution with exhaust gases caught in the clearance space. Dilution increases as the throttle is closed, at constant speed, but is not zero at full throttle.

After the dilution effect is eliminated from test results, the curve of optimum spark advance (for zero dilution) vs. speed can be analyzed, after the manner of Fig. 5, for the turbulence factor. Since  $e$ , explosion time, =  $\frac{2a_0}{9R}$ , the reciprocal of  $e$  is  $\frac{9R}{2a_0}$ . A plot of  $\frac{9R}{2a_0}$  for zero

dilution against  $R$  will find the constants  $\frac{1}{e_c}$ , where  $e_c$  is

the characteristic explosion time of the combustion chamber of the engine as a bomb without turbulence or dilution, and  $b$  the turbulence factor for the engine.

Dilution with exhaust gases is never absent in Otto cycle engine operation. At the end of the exhaust stroke of a 4-stroke cycle engine the clearance volume  $C$  of a cylinder is filled with exhaust gas of the absolute pressure



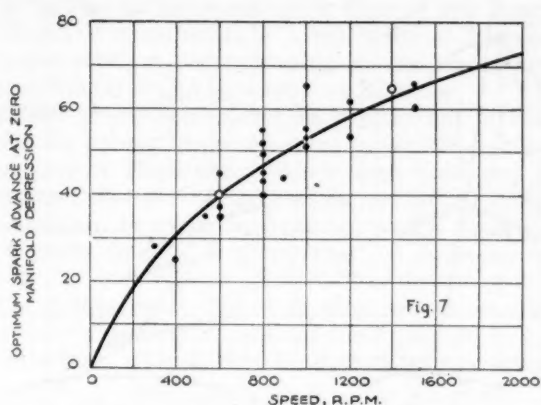


Fig. 7—Effect of speed on optimum spark advance. Ford engine

$p_e$  and absolute temperature  $T_e$ . As the piston moves down on the suction stroke this exhaust gas, or spent or dead gas, re-expands behind the piston. It continues to expand until the pressure drops to  $P_i$ , the intake manifold pressure. Of course when an engine with mechanically operated rather than automatic intake valve is throttled, exhaust gas flows from a cylinder into the intake manifold when the intake valve opens, and is later sucked back through the valve into the cylinder. Essentially, however, the clearance gas must be expanded to the pressure  $P_i$  before any new charge enters the cylinder.

The manner in which dilution with exhaust gas changes combustion rate (slowing it) is probably a complex of two things, each in its way a temperature effect. First, the exhaust or clearance gas is hotter than the new charge, and as the two mix, the temperature of the new charge is raised. The new charge being hotter before ignition, might be expected to burn more rapidly because of the dilution. This does not happen, being damped out and overcome by the second action of the dilution. This is the absorption of heat of combustion by the dead gases, as combustion progresses.

The temperature to which the combustion would go, without dilution, is greatly lowered by dilution. The operative factor is really the "heat-mass" of the diluting gases, their capacity for absorbing heat during temperature rise, or the product of their actual mass by their specific heat. As the new gas, during combustion, turns itself into exhaust gas, the specific heats after combustion will be the same for products from the new charge and the products of a previous combustion diluting the new charge. Hence the dilution factor which is operative in holding down combustion temperatures is simply the mass dilution ratio, of the total weight of gas in the cylinder in ratio to weight of new charge.

### Change of Mixture Ratio a Form of Dilution

The heating of the new charge, previous to ignition, by mixing with the diluting dead gases, is also nearly proportional to the mass dilution ratio, the temperature being shifted from  $T_i$  toward  $T_e$  very nearly in the ratio of masses of old charge and of new charge. This shift is affected somewhat by the fact that specific heats at temperatures  $T_i$  and  $T_e$  are not quite the same; but losses of heat to the cylinder walls during suction and compression strokes are much more important than any effect of variation of specific heat with temperature.

On the whole, then, we may expect the change in combustion rate consequent on dilution with dead gas to be some function probably of the mass dilution ratio of total gas to new charge.

The change of mixture ratio may itself be taken as one kind of dilution. We may consider the "perfect mix," or

mix for exact complete combustion, to be diluted either with excess fuel or excess air. Actually this assumption is a rather poor one, in the case of rich mixes at least, because the very chemical reactions of combustion are not the same when mixture ratio is varied. But the nitrogen component of the air probably acts as a diluent much as exhaust gas does in the engine. It is shown from engine tests that combustion is slowed by dilution with exhaust gases in proportion to the inverse cube of mass dilution ratio.

### First Tests Made on Ford Engine

Our first tests to check out the theory we have outlined as affecting the optimum spark advance for various loads and speeds were made on a Ford engine in the Cornell University laboratories.

This engine is stock save for minor changes; it has Dow metal pistons, an Atwater Kent open circuit ignition system and a Rayfield thermostat to control the temperature of discharge water. The carburetor was the regular Holley. Instead of the air horn for the supply of heated intake air we used electric heating, and the air was metered by a Durley orifice. Temperature of entering air was kept at 140 deg. Fahr. unless otherwise noted; discharge water was also 140 deg. Fahr. A Froude water brake was used to measure and absorb the torque. Gasoline was measured by a specially calibrated "flowmeter" (Penberthy).

Some tests made on this engine, a preliminary examination, have been presented already in Figs. 1 and 2. Determination of optimum spark advances was for some time a part of student work in the laboratory. Each day a series of combinations of load (intake manifold depressions) and speeds was investigated; at each load-speed setting a curve of brake torque vs. spark advance, with at least 5 points, was found. After a considerable amount of such data had been collected, curves were plotted as in Fig. 6, of optimum spark advance vs. intake manifold depression, for constant speed.

Such curves were used for reducing all results to zero intake manifold depression, as we had not at that time gone far on the analysis of the dilution effect. Reduction to zero intake manifold depression is reduction to a constant (not zero) volumetric dilution with spent gas, and to a mass dilution that is not even constant at all speeds,

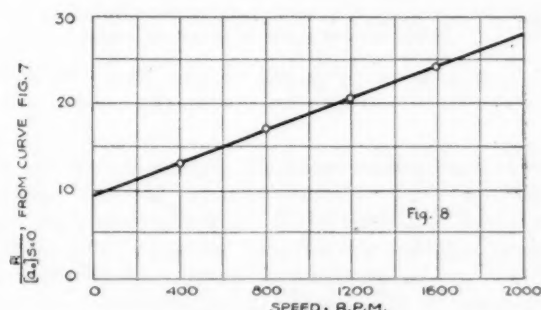
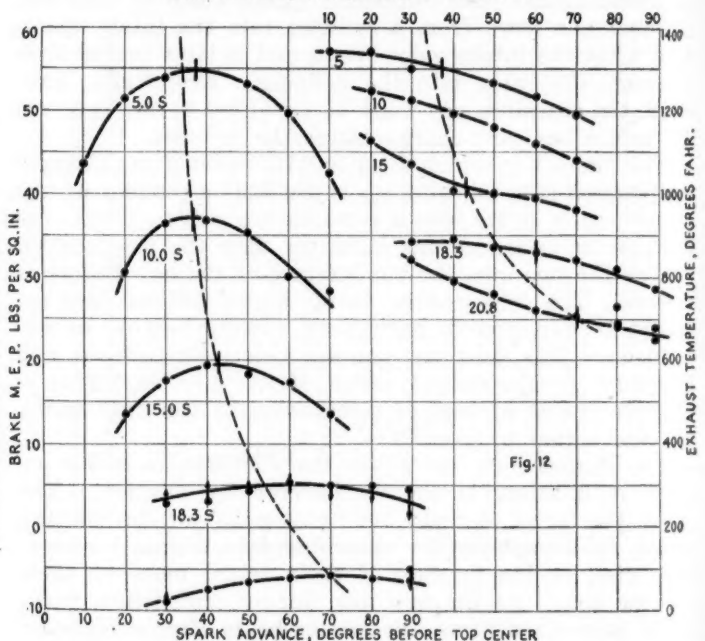
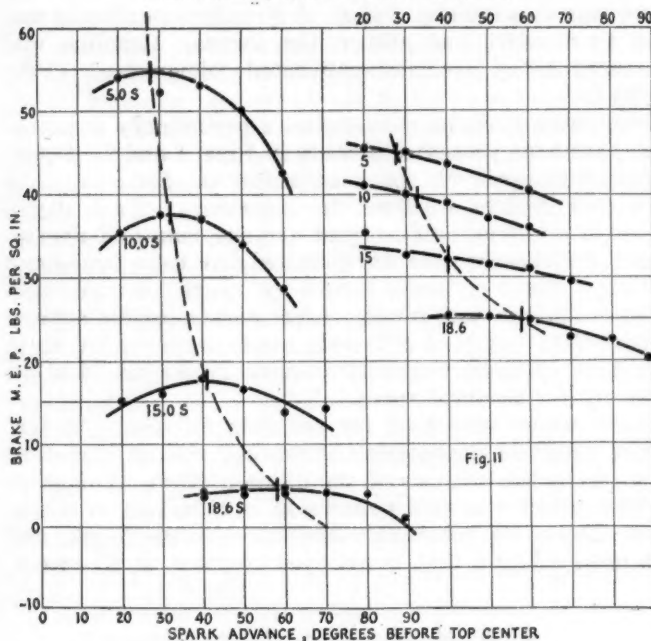
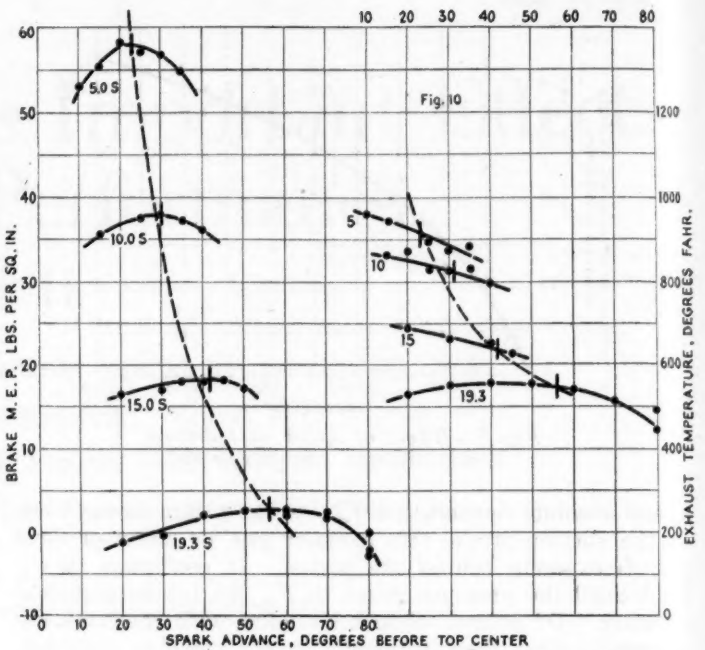
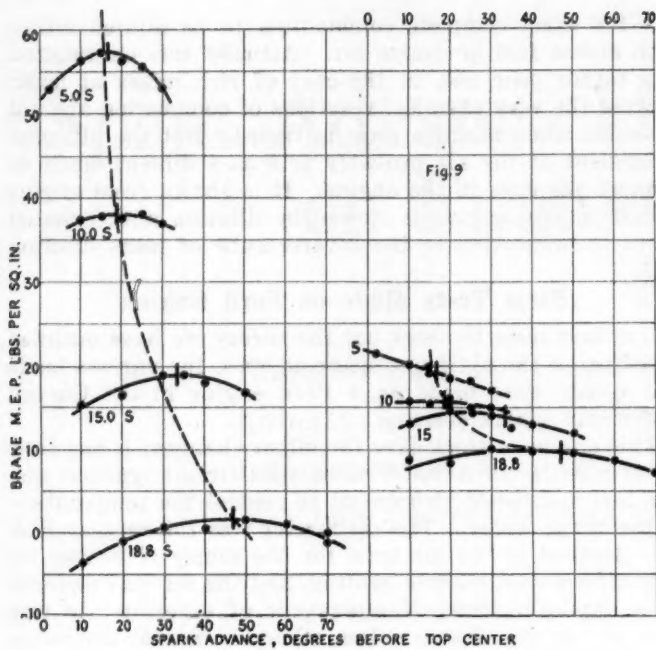


Fig. 8—Approximate turbulence factor for Ford engine at various speeds

because the exhaust temperature rises with speed. The curves of Figs. 6 and 7 illustrate, however, a very good method of analysis for commercial purposes.

In Fig. 6 the effect of intake manifold depression is seen to be, with sufficient accuracy, the same for all speeds. A curve of "intake manifold depression effect" can be drawn at the bottom of Fig. 6, and a curve parallel to this will answer for each speed. With the aid of this curve for intake manifold depression effect all the data were reduced to values for zero intake manifold depression, and with these reduced values the curve of optimum spark ad-



Figs. 9, 10, 11 and 12—Curves showing relation between brake m.e.p. exhaust temperature and spark advance on Continental engine running respectively at 400, 800, 1200 and 1600 r.p.m.

vance for zero intake manifold depression vs. speed, Fig. 7, is plotted. The optimum advance for any combination of speed and intake manifold depression can then be found by adding together the advance for speed effect from Fig. 7, and for intake manifold depression effect from Fig. 6. For example, at 800 r.p.m., 12 in. depression requires 47 deg. advance for speed, 13 for depression, total 60 deg.

It is obvious that if this possibility of representing optimum spark advance in a given engine as a sum of two parts, one for speed and one for intake manifold depression, is confirmed on other engines, we have immediately a basis for an automatic mechanical control of spark advance, which will keep it always very close to the optimum value.

In the example just cited control for speed alone would have to be set right for the full load conditions; and the error of spark setting at the 12 in. depression, if not corrected by hand control supplementing the automatic control by speed alone, would be sufficient to cause a loss of about 5 per cent in power and economy. This loss

occurs at the most common of running conditions, it is worth thinking about.

Since we have not, in the curves of Fig. 7, entirely eliminated the effect of dilution, but merely reduced to a case where dilution effect is nearly constant, we cannot perhaps determine the turbulence effect with complete accuracy. The form of the curve in Fig. 7 is due principally, however, to turbulence effect. Hence we plot in Fig. 10

$\frac{R}{[a_0] s = 0}$  vs.  $R$ , picking values of  $[a_0] s = 0$  from Fig. 7

for various values of  $R$ . The curve of Fig. 8 is really only a graphic analysis of Fig. 7. The equation of the straight

line in Fig. 8 is  $\frac{R}{[a_0] s = 0} = 9.3 (1 + 0.0010 R)$ . Hence

the equation of the curve in Fig. 7 is  $[a_0] s = 0 = \frac{0.108 R}{(1 + 0.0010 R)}$ . Since  $[a_0] = (2/9)R \times (\text{explosion}$



time), it follows that the explosion time of the Ford engine combustion chamber as a bomb, without turbulence, but with the dilution corresponding to zero intake manifold depression, is  $(2/9) \times 0.108 = 0.0230$  sec.

It is rather gratifying to find, in Fig. 8, that turbulence checks out for an engine to the same type of law of action as in the case of Hopkinson's bomb tests (compare Figs. 8 and 5); and that the turbulence factor for the speeding up of combustion by turbulence can so readily be evaluated by simple tests for the determination of optimum spark advance.

As Fig. 6 illustrates, the data obtained from student work on the Ford engine were not good enough to evaluate the dilution factor in spark advance in any scientific way.

Hence we turned to a Continental 6-cylinder model 7R engine, which we have set up in the Cornell University laboratories with an electric dynamometer and a fairly complete outfit of measuring devices.

This engine has a "Sylphon" thermostat controlling discharge water to 135 to 140 deg. Fahr. Carburetor is a Stromberg, model M1. Intake air was at room temperature; a considerable hot spot is incorporated in the manifold. Compression ratio is 4.55. This engine detonates considerably at full throttle on Standard Oil gasoline, and this fact was at times bothersome, and yet led into one

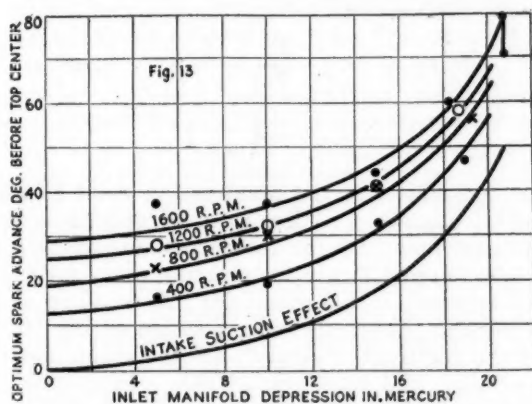


Fig. 13—Optimum spark advance plotted against manifold depression at various speeds, Continental engine

of our most interesting discoveries about reaction rates in combustion—the effect of an "antiknock."

The main body of our experimental work on the Continental engine is shown in Figs. 9, 10, 11 and 12. At each of the speeds 400, 800, 1200 and 1600 r.p.m. we made sets of runs at 5, 10, 15, and somewhere near 20 in. of mercury intake manifold depression. In these runs we found brake m.e.p. and exhaust temperature as functions of spark advance. Optimum spark advance can then be read off at the peak point of the brake torque (m.e.p.) curve found, at each combination of speed and depression, as resulting from change of spark advance.

Fairing curves, dash lines in Figs. 9 to 12, of spark advance vs. m.e.p. were then drawn in for each constant speed. The general results of variations of optimum spark advance with intake manifold depression (load) are grouped in Fig. 13, plotted for constant speeds. The observed points plotted in Fig. 13 are the peaks of the curves of Figs. 9 to 12, without fairing; the curves drawn in Fig. 13 are laid in with regard both to each other and to the fairing curves in Figs. 9 to 12. The curves of Fig. 13 are replotted in Fig. 14 as curves of spark advance at constant intake manifold depression vs. speed.

Throughout the tests on the Continental engine the mixture ratio was kept near to that of maximum power.

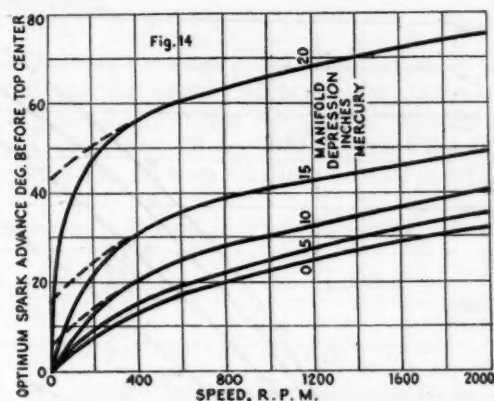


Fig. 14—Curves showing relation between optimum spark advance and speed for various manifold depressions, Continental engine (from faired curves in Fig. 13)

When running near 20 in. depression any setting of mixture for steady satisfactory running was at the lower speeds difficult to almost impossible; it could be done at the higher speeds. This circumstance is probably a part of the reason why spark advance at the 20 in. depression must be so great at low speeds. Dilution of charge with exhaust gas is of course very high at 20 in. intake manifold depression; and is higher at low speeds than at high ones, because the exhaust temperatures are higher at high speeds.

The exhaust temperatures found are plotted in Fig. 15 against intake manifold depression for constant speeds, and in Fig. 16 against speed for constant intake manifold depressions. The fairing of the data is done in Fig. 15; Fig. 16 is only a replot of the faired lines of Fig. 15, with variables exchanged.

We repeat on the Continental engine the finding on the Ford, that for all practical purposes optimum spark advance can be represented as the sum of two functions, one a function of speed only, the other a function of intake manifold depression only. This follows from the fact that the curves in Fig. 13 are substantially parallel; the increase of spark advance for change of intake manifold depression at constant speed is shown in the lower curve, labelled "intake manifold depression effect," in Fig. 13. An approximate empirical equation for this "intake manifold depression effect" is  $a = 18 \left( \frac{P_e}{P_t} \right)$

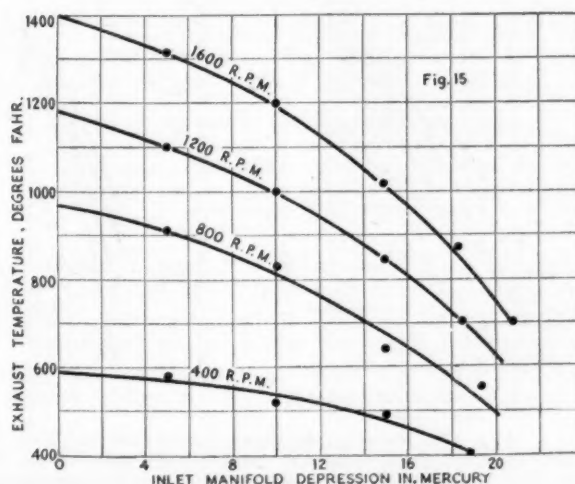


Fig. 15—Relation between exhaust temperature and load as indicated by manifold depression. Continental engine

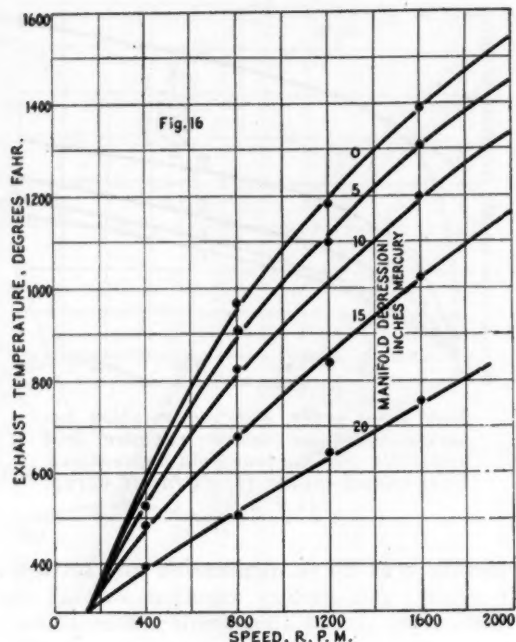


Fig. 16—Relation between exhaust temperature and speed for constant loads as indicated by manifold depression. Continental engine

For the Ford engine the corresponding equation is

$$a = 18 \left( \frac{P_e}{P_i} \right)$$

the effect is less, probably, because the dilution at zero intake manifold depression is larger in the lower compression engine.

The power losses (and economy losses in proportion) from improper spark advance are clearly indicated in Figs. 9 to 12. It seems, in view of these curves, that automatic spark control, mechanically adding the two separate advances for speed and for intake manifold depression, would justify itself in improved power, economy and flexibility of engine performance. There would still be need of hand adjustment to take care of a cold engine, and of a dirty engine; but with the engine warmed up and a setting made for its internal condition all the spark control needed to take care of load and speed variation would be automatic, and so would get done as now it does not.

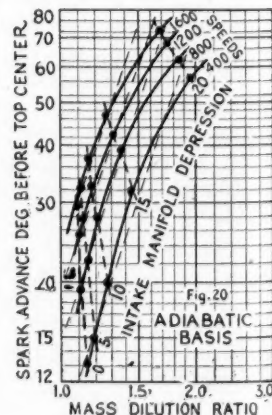
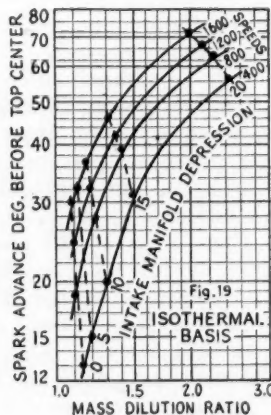
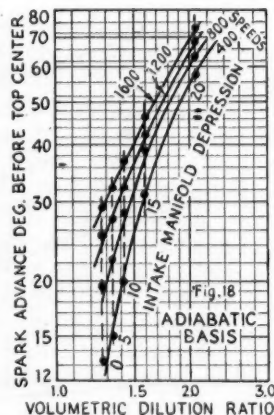
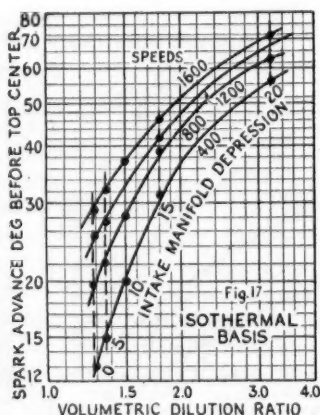


Fig. 17—Relation between spark advance and volumetric dilution ratio, at various constant speeds and manifold depressions, isothermal basis. Fig. 18—Relation between spark advance and volumetric dilution ratio at various constant speeds and manifold depressions, adiabatic basis. Fig. 19—Relation between spark advance and mass dilution ratio at various constant speeds and manifold depressions, isothermal basis. Fig. 20—Relation between spark advance and mass dilution ratio at various constant speeds and manifold depressions, adiabatic basis

It would also be easy to take care of altitude effects by a change in linkage on the automatic spark control, on the intake manifold depression side; necessary because of greater dilution with exhaust gas at high altitudes, at the same intake manifold depressions. (The automatic device would be controlled by pressure differences, when the function it controls is really a consequence of pressure ratios;  $P_e - P_i$  would be substituted in the mechanism for

$$\frac{P_e}{P_i}$$

In a scientific analysis of that component of spark advance due to dilution with exhaust gas we need to find whether it is a matter of volumetric or mass dilution, and whether in computing the dilution we must figure the re-expansion of the exhaust gases in the depression stroke as adiabatic or isothermal. It was to get data for the study that the readings of exhaust temperatures in Figs. 9 to 12, and in Figs. 15 and 16, were taken.

The volumetric dilution ratio, of total gas to new charge in the cylinder, is

$$1 + \frac{\left( \frac{P_e}{P_i} \right)^{1/\gamma}}{r - \left( \frac{P_e}{P_i} \right)^{1/\gamma}}$$

the weight dilution ratio is

$$1 + \frac{\frac{T_i}{T_e} \cdot \frac{P_e}{P_i}}{r - \left( \frac{P_e}{P_i} \right)^{1/\gamma}}$$

In these formulas  $r$  is the compression ratio 4.55 for the Continental engine;  $\gamma$  is the ratio of specific heats, 1.33 for adiabatic and 1.00 for isothermal expansion;  $1/\gamma = 0.75$  or  $1.00$ ;  $T_i$  and  $T_e$  are the absolute temperatures of intake and exhaust, in the manifolds;  $T_i$  is taken as  $100 + 460 = 560$  deg. Fahr. absolute, because of the "hot spotting" of the manifold;  $P_e$  and  $P_i$  are the absolute pressures in the exhaust and intake manifolds. In calculations  $P_e$  was taken as 29.4 inches of mercury and  $P_i$  as  $(P_e - S)$ ,  $S$  being intake manifold depression in in. of mercury.

Toward full throttle variation of dilution with  $\frac{P_e}{P_i}$

is slow; at closed throttles exhaust back pressure is negligible; hence the use of barometer divided by (barometer



—  $S$ ) for  $\frac{P_e}{P_i}$  causes little error in the calculations.

With the computed values of volumetric and mass dilution ratios and the optimum spark advances from the faired curves in Figs. 13 and 14, curves of spark advance against dilution ratios, for constant speeds, have been plotted in Figs. 17, 18, 19 and 20, on logarithmic scales.

### Evaluation of Turbulence Factor

If dilution had an effect separable from the speed (turbulence effect) the family of curves for the different constant speeds in these figures should be a parallel set of lines, of constant vertical offset from each other. This is obviously not the case when we measure dilution volumetrically; is approached closely when we measure dilution by mass ratio; and is better given by the adiabatic than by the isothermal assumption of the law of re-expansion of clearance (exhaust) gases on the depression stroke. Further, the dashed straight lines in Figs. 19 and 20, of slope 3, show that the increase of spark advance due to dilution is approximately proportional to the cube of the mass dilution ratio; or in other words, combustion rates vary inversely and explosion times directly as the cube of the adiabatic mass dilution ratio total gas to new charge.

If in plotting Fig. 20 the unfaired data of optimum spark advances, taken directly from Figs. 9 to 12, is used, the agreement with the cube law is rather improved; hence the use of our faired curves of spark advance has not been responsible for this suggested law of action of dilution. This cube law, of course, is merely suggested, not proven, on such a slender basis of data as here used; but it was to be expected on general grounds and is here found to give as good an account of the facts as any simple hypothesis tried.

Since it is now possible to eliminate the dilution or intake manifold depression factor from the spark advances, the turbulence factor may be evaluated. This has been done in two ways. First, as was done in the case of the Ford, all the spark advance data were reduced to values for zero intake manifold depression, at the various speeds. Fig. 14 shows this reduction for the Continental

engine. Then values of  $\frac{R}{(a_o, \text{zero intake manifold depression})}$  were plotted against  $R$ , giving the lower straight line

in Fig. 21. The equation of this line is  $\frac{R}{[a_o] s = 0}$   
 $= 22 (1 + 0.001 R)$ ; or by inversion,  $[a_o] s = 0$ , is equal  
to  $\frac{0.0455 R}{(1 + 0.001 R)}$ .

This corresponds to an explosion time in the combustion chamber, without turbulence, but with the dilution existing at zero intake manifold depression, of  $(2/9) \times 0.0455 = 0.0101$  second.

### Investigation of Zero Dilution

This may be compared directly with the corresponding value for the Ford engine of 0.0230 second; and the turbulence factor, found in the same way, comes out the same (0.001) for both engines. This is interesting; both are of the L-head type, of rather similar dimensions. The much quicker explosion time for the Continental engine may correspond to a better shape of combustion chamber, better placing of spark plug, better carburation due to the "hot-spot," etc., and the higher compression ratio.

It is possible also, in the case of the Continental engine, to investigate the case of zero dilution. Assuming

the cubic law of slowing up of combustion by adiabatic mass dilution, the spark advances for the Continental engine at zero dilution are 9.5 deg. at 400 r.p.m., 15 at 800, 19 at 1200, and 23 at 1600. (See Figs. 19 and 20 for this reduction to zero dilution, or 1.00 dilution ratio.)

The upper straight line in Fig. 21 plots  $\frac{R}{a_o}$  of these zero dilution values against  $R$ . Its equation is

$\frac{R}{a_o, \text{zero dilution}}$   
 $= 32.5 (1 + 0.00075 R)$ ; corresponding to  $a_o$ , for zero  
dilution =  $\frac{0.0308 R}{(1 + 0.00075 R)}$  and explosion time with zero  
dilution and zero turbulence of  $(2/9) \times 0.0308 = 0.0068$   
sec.

It will be noticed that the value of the turbulence factor, the coefficient of  $R$  in the denominator of the

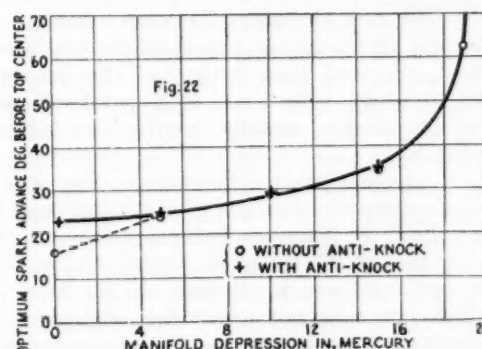
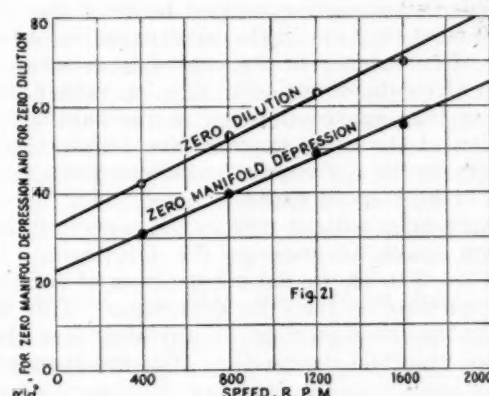


Fig. 21—Relation between engine speed and the ratio  $R/a_o$ , with zero dilution and zero manifold depression respectively. Fig. 22—Curves showing relation between optimum spark advance and manifold depression with and without anti-knock. Note effect of detonation and its suppression by anti-knock. Continental engine running at 600 r.p.m.

spark advance equations, is not the same when the equation is found for zero intake manifold depression as when it is found for zero dilution. This is due to the fact that the dilution at zero intake manifold depression is not constant as speed changes, but is less (in mass dilution) at higher speeds in consequence of higher exhaust temperatures.

Further, it will be noticed that explosion time in the engine cylinder, even with some dilution, but without turbulence is of the order of 0.02 to under 0.01 second. These values are conspicuously smaller than the values quoted early in the paper for bomb experiments, which ran around 0.05 to 0.06 second for max. power mixes. The

reason for the difference is partly in size of combustion chamber of the engine as compared with the bombs; on this account alone the explosion times in the engine, in view of the empirical square root law of distance for time of flame travel, should be from 0.50 to 0.75 times the explosion times in the bombs. The main factor making the explosion times less in the engines than in the bombs, even without turbulence, is temperature.

The Continental engine gets its charge in at about 560 deg. Fahr. absolute. Compression multiplies this temperature by the  $(\gamma-1)$  power of the compression ratio, or by about 1.65, making temperature preceding ignition about 930 deg. Fahr. absolute. Combustion speed being proportional to about the cube of the temperature preceding ignition, the combustion rate is increased by the adiabatic compression about 4.5 times over what it would have been at the intake temperature, and about 5.3 times over what it would have been if started from room temperature.

### Antiknock Does Not Affect Explosion Time

Even without turbulence, then, we might expect explosion times in automotive engines to be of the order of 1/5 to 1/10 what they are in the bomb experiments quoted. The effect of turbulence in the engine is an offset to the slowing up of combustion due to dilution rather than the main reason that explosion times in the engine cylinder are less than in the bomb experiments, on sizable bombs, in laboratory work. Of course turbulence remains highly important in high-speed engines.

It will have been noticed that in the experimental work on optimum spark advance on the Continental engine, shown in Figs. 9 to 12, we did not get data at full throttle, going only as close as the 5 in. depression. This was because of detonation occurring at anything less than the 5 in. intake manifold depression. We investigated later what would happen in the presence or absence of detonation. The work was at 600 r.p.m. The results are shown in Fig. 22. We ran through the whole throttle range, 0, 5, 10, 15, and 19 in. intake manifold depressions, without any antiknock, and then with it. The dose of antiknock, tetraethyl-lead, was 5 c.c. to 2 quarts of gasoline, or 20 times the dosage usually required or advised for knock suppression.

The results are extremely interesting. For any intake manifold depression big enough of itself to stop detonation by throttling, or pressure reduction, the presence of antiknock, in dosage 20 times the usual value, does not change the optimum spark advance at all according to our data; hence it does not affect the explosion time or reaction velocity of combustion. The accuracy of determination of optimum spark advance is perhaps  $\pm 2$  deg.; on a 30 deg. advance this is an accuracy in explosion time of  $\pm 7$  per cent. The usual dosage of antiknock cannot then alter the reaction rate by more than 1/3 of 1 per cent.

### Wide Experimental Field Opened

The hypothesis, then, that antiknocks stop detonation by changing reaction rate of combustion, seems to have here a considerable jolt. It does stop the detonation, however; and further with detonation stopped, the spark advance-intake manifold depression curve is smooth and continuous to zero intake manifold depression, and combustion follows a single set of laws (those of normal, non-detonating combustion) over the whole throttle range.

In the absence of antiknock, combustion seems to follow two laws, as indicated by the dotted line in Fig. 22; the normal laws for intake manifold depressions greater than 5 inches in this case; and the abnormal laws, involving detonation, at between zero and 5 in. depressions. When detonation occurred the torque also was perceptibly less than when it was suppressed.

In summary, we have shown spark advance to be a matter of the relation of explosion time to the rotation speed of the engine. From a simple hypothesis about flame speed, combined with the geometric shape of the combustion chamber, we have deduced that one-half of the pressure rise of an "explosion" should occur at or near  $\frac{3}{4}$  of the explosion time; and have checked the conclusion on pressure time curves of both bombs and engines.

We have shown that for optimum spark advance the half pressure rise, or  $\frac{3}{4}$  of explosion time, should occur at dead center position of the piston. Hence we have made it possible, through the experimental determination of optimum spark in an engine in operation, to calculate back to the explosion time as it actually happens in the engine.

This opens up a wide field for experimental work, in finding effects of mixture ratio, temperature, turbulence, dilution with dead gas, etc.; shape and size of combustion chamber, etc.; with a possibility, hitherto not known, of finding numerical values for effects of turbulence, dilution, and the like, which may put combustion chamber design in the future on a quantitative basis.

On the practical side we have shown that optimum spark advance can be represented, with satisfactory accuracy, by an additive relation of two components, one for speed only, one for intake manifold depression only; hence that a fairly complete automatic spark advance mechanism, covering both load and speed effects, is a possibility.

Special thanks are due for taking of data to Messrs. D. A. Rogers and A. Simpson, instructors in the laboratories at Cornell University; and for reading and criticism of manuscript to Professors Davis and Gage.

### Effects of Spark Plug Position

TESTS to determine the effect of a change in the number and position of the spark plugs in engine cylinders on the power output of the cylinders have been conducted by the Engineering Department of Air Service, McCook Field, Dayton, Ohio.

The tests were made on aircraft engine cylinders of  $5\frac{1}{2}$  by  $6\frac{1}{2}$  and  $6\frac{1}{2}$  by  $7\frac{1}{2}$  in. Both cylinders have four plug bosses located horizontally at the sides of the combustion chamber at 90 deg. They were mounted individually on the Universal test engine (attached to a 100-hp. Sprague dynamometer) and fitted with four single-cylinder Dixie magnetos with selective switches, making possible operation with any combination of plugs. A rotary spark indicator was provided to indicate spark setting.

The following general conclusions seem warranted (spark set for best power in all cases):

- (a) With detonation eliminated.
  - (1) There is no definite drop in power with reduction in the number of plugs until ignition is restricted to one side of the combustion chamber.
  - (2) There is little difference in power between intake and exhaust plug operation.
  - (3) The required spark advance increases as the number of plugs decreases.
- (b) With detonation tendency.
  - (1) The power increases with an increase in the number of plugs.
  - (2) The intake plugs appear to give better power than the exhaust plugs.
  - (3) The spark advance for maximum power varies in general inversely as the number of plugs in operation.
  - (4) Greater spark advance is possible with intake than with exhaust plugs.



# What Can Manufacturers Do to Promote Open Car Sales?

Chief requisite is to improve top and curtain construction to give adequate weather protection for all-year service. Problem a difficult one to solve. Excessive first cost and patents are ever present obstacles in way of designing.

**I**N the last analysis, the chief advantage of a closed car is the protection from the elements it affords and the possibility of changing it quickly from a closed to a comparatively open body. The closer an open car can be made to approximate these conditions the easier it becomes to sell.

At first thought the problem of making a simple, durable and substantially weather-tight open body seems easy to solve, but analysis shows the problems involved to be both numerous and troublesome if excessive first cost is to be avoided and a wholly satisfactory result attained. Besides mechanical difficulties, numerous patents are involved, so that the designer must watch his step if pitfalls are to be avoided.

A continued tendency in demand toward a larger proportion of closed bodies has created many problems among car and body manufacturers. Even in sections such as Southern California, where the prevailing weather is fair and comparatively warm, there are reports of increasing resistance to the sale of open cars. The industry is, of course, making strenuous efforts to rearrange its production schedules accordingly, but the transition period is full of difficulties for which a solution is being sought.

Some manufacturers have hazarded the guess—for it is little better than a guess—that the "ultimate" rearrangement of production to meet demand will bring the ratio of cars built to about four closed to one open. In the interim what can be done to promote open car sales? In other words, how can the open car be made more suitable for year around service?

## Top and Side Curtains Inadequate

It is generally agreed that the chief fault of the open body lies in the construction of the top and the curtains. These do not afford adequate protection against rain and wind, especially in cold weather. The average curtain is unsightly, while the lights soon become scratched and lose their transparency. It is admitted that these faults can be overcome with certain types of construction, providing sufficient care is used in making and fitting curtains, but the cost of such a job is said to bring the price of the open body very close to that of a closed one, in which case the latter is almost invariably preferred.

The question, then, is, Can open bodies which overcome the disadvantages cited be produced at a cost which enable them to compete with closed bodies? Anyone with a sound plan calculated to give an affirmative answer to this question will not lack for interested listeners. He must, however, be fully prepared to prove his case, for innumerable experimenters already have tackled this

problem and spent large sums in an effort to solve it only to fail, due to high first cost or inability to meet some service condition which was not at first apparent.

Some few manufacturers are turning out permanent tops on all open models, but a large majority still furnish a folding top, although it is admitted that on standard models the top is seldom lowered. In fact, on some makes irons for holding the top when it is folded are not regularly furnished. On "sport" models, however, the top is put down more often, it is said, with the result that top supports are furnished as standard equipment.

## Permanent Top May Be Step in Solution

It apparently costs but little, if any, more to build a folding top, and such a top, as a rule, materially decreases shipping space, a characteristic which is especially desirable in the case of cars built for export. On the other hand, a folding top often looks less sightly than a permanent structure and does not adapt itself so well to a weather-tight curtain enclosure. At least one permanent top frame, which is a combination of wood and metal members, is now on the market. It is said to be somewhat less expensive than conventional folding top frames, with the added advantage of holding its shape well and enabling the use of better fitting and better looking curtains than are ordinarily found. It may be that some such development as this will prove to be one satisfactory step in the solution of present top difficulties, but the construction of a really sightly and wholly convenient form of side curtain is still very much of a problem.

There are many who believe that, except perhaps for cars in the low-price class, we shall come in time to some form of curtain with a rigid or semi-rigid frame. But here again there are some difficult problems to meet. In the first place such frames appear to require a considerable amount of individual fitting, which is difficult to handle in any large production scheme. This is due to wide variations of half inch or more in body and top dimensions, which have as yet proved almost impossible to avoid. These variations arise in part from the use of wooden bows and other wooden parts, the dimensions of which are altered by changes in atmospheric conditions and in part from failure to hold to sufficiently narrow limits in body and top construction.

Another source of trouble in connection with the use of rigid frame curtains is the tendency of fabric to shrink and either warp the frame or pull the top out of shape, so that framed or even unframed curtains no longer fit. Flexible metal curtain frames have been tried without success on this account.

Framed curtains which fit when new not infrequently give trouble after a season of use, because they change in dimensions or because the body and top sag or spread in such a way that the space which the frames are intended to fit is no longer the same.

Nevertheless framed curtains with glass lights have some important advantages which are well worth seeking, provided the disadvantages cited can be overcome. They can be made so slightly as to give the body an appearance which compares favorably with that of a closed car. They are easily cleaned and are not easily scratched, hence a clear vision is always available. They are readily fastened in such a way as to open with the doors and can be made reasonably weather-proof.

On the other hand, care must be used to insure a

structure which will not rattle, while a suitable storage space must be provided where the sections are protected from breakage and are readily accessible. Curtain frames should also be easily attached if intended for storm purposes.

A large proportion of open car tops are covered with rubber coated fabrics which closely resemble leather in appearance, but many sport models are fitted with light colored ducks or similar cotton materials, many of which are two-ply with a coating of rubber between to render them water-proof. Others, including some imported ducks, depend upon a very close weave to maintain their water-tight character. All of these khaki colored top materials are said to be subject to fading in color, a fact which makes it difficult to match new curtains.

## New K. S. Gasoline Gage Operates on Hydrostatic Principle

**T**HE K. S. gasoline gage recently adopted as standard equipment for the Oldsmobile eight, is composed of a dash gage, a pressure chamber contained in the gasoline tank and an air-line connecting the two. The gage is constructed on the U-tube principle, one leg of the U being a calibrated glass column and the other leg a threaded metal tube. The two legs are connected at the bottom by a small flexible tube. The assembly is so arranged that by means of an adjusting nut it is possible to raise or lower the threaded metal tube.

When air pressure is applied to the surface of the liquid in the threaded metal tube, the liquid is forced down and the surface of the liquid in the glass tube is correspondingly forced up. The level of the liquid in the glass tube is consequently a function of the pressure applied to the threaded tube.

Because of the commercial impossibility of securing glass tubes of uniform cross-sectional area, and since the calibration of the instrument will depend on the ratio of the cross-section of the threaded metal tube to the glass tube, compensation for the variations in cross-sectional area is made by dropping shims into the threaded tube. These shims are small wires about 2 in. long and enough of them are put in to insure the proper ratio. The

threaded tubes are always made slightly oversize so as to permit the shim method of calibration.

The pressure chamber located in the gasoline tank consists of two bells, a top bell and lower bell slightly off center and separated from each other by a bell plate. A small hole, B, in the bell plate places the two bells in communication with each other. There is a hole, A, near the bottom of the lower bell and two small holes, C, in the bell plate, which provide for communication between the top bell and the gasoline tank. A wire screens the gasoline and prevents clogging of the holes, A, B and C. The air-pressure tube extends from the top bell to the top of the gasoline tank and is connected by the air lines to the top of the threaded metal tube of the gage. The gasoline tube extends from near the bottom of the lower bell to the top of the gasoline tank and is connected by the gasoline line to the vacuum tank. A small air pipe extends from the bottom of the lower bell to the outer surface of the top of the tank.

In operation, the top bell, air tube and air line are filled with air. The gasoline in the gasoline tank exerts through the holes, C, a pressure on the air within the top bell which pressure is communicated to the gage. The pressure which is indicated by the gage is that due to a depth of gasoline equal to the difference in elevations of the surfaces of the gasoline in the gasoline tank and in the top bell. The gage reads correctly only when the top bell is filled with air and contains no gasoline. The pressure then measured is the depth of gasoline above the hole, C. As long as the top bell, air line and air tube are kept filled with air the gage registers.

To replenish the air in the top bell, provision is made in the following manner. Gasoline is drawn by the vacuum tank through the hole, A, into the bottom bell and then through the gasoline tube. The size of the hole, A, is so regulated that a small suction is created within the bottom bell. This suction is just sufficient to cause a small quantity of air to pass down through the air pipe into the lower bell. A small portion of this air is carried away with the gasoline to the vacuum tank, another portion is trapped and remains in the upper part of the bottom bell. When the vacuum tank ceases to operate, the air which has been trapped in the bottom bell bubbles up through the hole, B, and forces any gasoline which may be in the air bell out through hole, C. Thus, air is replenished at each operation of the vacuum tank.

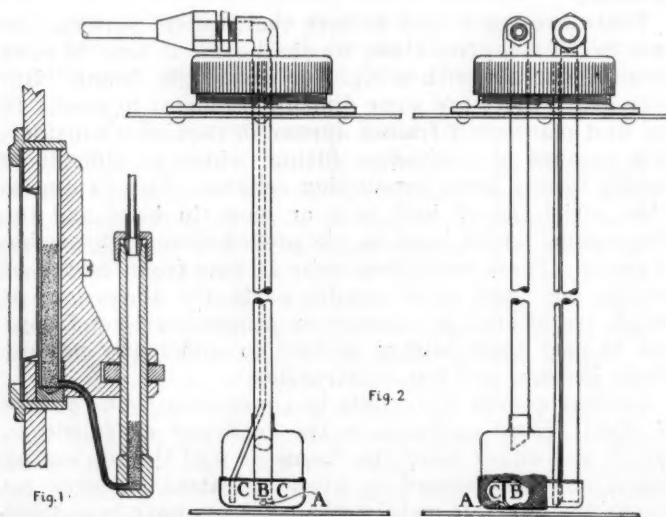


Fig. 1—Dash gage. Fig. 2—Pressure chamber





# The FORUM



## Superiority of Non-Metallic Material for Generator and Crankshaft Gears Questioned

Editor, AUTOMOTIVE INDUSTRIES:

There appeared in the May 17 issue of AUTOMOTIVE INDUSTRIES an article on non-metallic gear material by J. Edward Schipper. While it is generally conceded that quietness can be obtained in the timing gear train by the use of non-metallic material, the statement made in the article that "manufacturers of non-metallic gear materials now have become convinced that it is better to make the two smaller gears non-metallic" is open to question.

One of the reasons given to substantiate the use of non-metallic material on the smaller gears is "the teeth of the crank shaft and generator gears wear only at the point of meshing with the cam shaft gear, whereas the cam shaft gear wears at two points, where the crank shaft gear meshes with the cam shaft gear and where the generator gear meshes with the cam shaft gear." In this reasoning there evidently was no consideration given the fact that in most three-gear trains, the crank shaft gear revolves twice to the one revolution of the cam shaft gear, and the generator gear revolves three times to the one revolution of the cam shaft gear. A little further consideration will then show that even though the cam shaft has two points meshing during one revolution, the crank shaft *equals* that condition by revolving twice with one point in mesh and the generator shaft *exceeds* it by revolving three times with one point in mesh.

Carrying this thought to a further deduction will show that for every two contacts received by each tooth of the metal cam gear there is a total of five contacts on the teeth of the other two gears.

It would seem from the above that the recommended use of non-metallic material on the smaller gears is advisable because of less wearing points is considerably in error.

Quoting the other reason offered in the article "there is an uneven wearing action upon the cam shaft gear. At one point it is being driven by the crank shaft gear and at another it is driving the generator gears. Hence, the fact that the cam shaft gear has twice the number of teeth is more than offset by the double and uneven wear."

In this reasoning the fact that the wear of the cam shaft gear comes on opposite sides of the same tooth is possibly overlooked. However, this condition rather helps than detracts, for it provides an even wear on both sides of the same tooth, instead of a double wear on the one side, thus making it more likely that the involute will be retained for a doubly long period and subsequently avoiding the wearing of a "flat."

This condition accentuates the reason given above by the writer, for, speaking purely in terms of individual tooth-face contacts, the generator gear has three times as many and the crank gear twice as many as the cam gear.

The greater the number of contacts, the greater the

respective wearing at those points. This would mean an uneven wearing of the generator gear teeth compared with the crank gear teeth, whereas the wear on the cam gear teeth would be much less in any case, particularly when consideration is given to the fact that the wear is distributed to both sides of the same tooth.

The less the wear, the longer the "involute" is retained or the longer a "flat" is avoided. It can be seen that the cam gear is most likely to benefit from this condition with the usual advantages that accompany a retained involute.

It is believed from the foregoing that it can be seen there are many reasons to doubt the accuracy of the causes for the decision that the non-metallic gear should be used on the generator and crank shafts. No reasons (of which there are many) will be given here for the use of non-metallic material on the cam shaft. The object of this letter is merely to show the apparent error in the deductions made of certain gear train conditions which were taken to be advantageous whereas they were really detrimental.

T. C. ROUNTREE,

Westinghouse Electric & Manufacturing Co.

## Permanent Top Design Problems

Editor, AUTOMOTIVE INDUSTRIES:

The problems in connection with the design and construction of permanent tops are varied. The chief problem is to secure one of attractive appearance without the complications of the California top and without the usual defects found in the folding top, particularly as regards showing of bows and unsightly appearance at the back curtain corners after the top has been used for some time.

The stiff construction of the ordinary solid top has a tendency to loosen windshield mountings both at the top and at the body. Special provisions must be made to avoid this possibility. If a wood frame is employed the problem of anchoring the bows to the side members is one of securing joints which will stay tight without an undue increase in the weight of the top by the use of numerous brace irons.

The weight of the top between the front and rear support must be kept down to the minimum in order to avoid excessive stresses at all the joints in the top. To this end, we have employed laminated wood side rails and bows and use no metal braces at any point in the top. We have found that it is possible to build a permanent top with less weight than the ordinary top with metal sockets.

J. M. CRAWFORD, Chief Engineer,  
Auburn Automobile Co.

## More Light on the Truck Industry

Editor, AUTOMOTIVE INDUSTRIES:

I have been interested in the various articles that have appeared regarding "Motor Truck Industry Evils," and the letter of E. C. Shumard just appearing tempts me to add my views.

I recently thought that I would re-enter the truck industry from the retail selling side, as an analysis convinced me that with the improvement of general business there would be an improvement of truck business. Events have since justified this belief. I first made a careful study of the financing required based on so many sales of vehicles and so many sales of parts. Then I made a careful study of the market possibilities and they certainly seemed to warrant enough business to swing all overheads and return a handsome profit. Getting an option on what I considered an ideal place of business I proceeded to try to raise the capital.

I approached bankers. I was told calmly that they disapproved of the truck business and believed there were many better businesses. They told me if I got going strong and successfully that perhaps they would reconsider their attitude, but now—no loans nor recommendation for loans. I then approached some strictly passenger car sales dealers to suggest to them that a truck agency would round out their line. I found that all of them had dabbled in trucks at one time or another, and that they had all had their fingers burned. Never again, they said.

They had found, as Mr. Shumard states, that trucks were sold to men or small companies as a means of putting them in business and that the first down payment was often not made until a few months had elapsed. They had found also the great evil of the trade-in truck, which having been found to be of no value to the original owner as a truck was found to have undiscovered sources of wealth as a swapping proposition. Cases were related to me where taking the actual value of the old truck, the traded-in value and the money given on a long term payment of the new truck the resultant figuring showed that the equivalent of over a 40 per cent discount had been granted. Further, that the old used truck had itself often to be sold on long term payments—a mighty dangerous proposition.

One man I approached told me that in entering the truck retail dealer's business there should be provided enough resources for the following:

- Dealing in new cars, and financing their long time sale.
- Financing some purchasers whom you are setting up in the truck operating business.
- Dealing in used trucks and financing their long term sale.
- Financing the excessive discounts—or in other words, Financing the loss you will have to make in selling some trucks.
- Financing the operations of your service station.

This last item came under the ban of many dealers as they stated that most truck purchasers adhered to the old-time year's guarantee idea, and that the dealer had often to give gratuitous service on some pretty antique trucks.

After reviewing all these data I confess I got cold feet on the proposition and felt it would be much healthier out than in, so I dropped the idea.

I feel, however, that the industry should study some of these phases and think how it can correct the abuses that have crept in. Take the used truck, for instance. Speaking broadly, if its usefulness is no longer an asset to its original owner, how much of an asset is it likely to be to any new user. To my mind there is very little

justification for trading in used trucks, unless there be some special reasons.

The industry can correct its abuses but the correction must come from the inside. It has it in its own hands to do this and should do so.

While on this subject there is another grave waste—this time in the operation of trucks. I refer to the silly waste of each corner grocery store having its own truck with its own small garage and its own poor mechanic. There is room for intelligence to be used in forming transportation companies to handle delivery problems whereby the public would get better and cheaper service.

JOHN YOUNGER.

## Railroads Need Cooperation

Editor, AUTOMOTIVE INDUSTRIES:

Your June 7 issue of AUTOMOTIVE INDUSTRIES carries an editorial which in part reads as follows:

"No one begrudges the railroads a fair profit and industry is practically unanimous in its opposition to Government ownership or operation, provided the carriers can give an efficient transportation service. The railroads have done little to make themselves loved, however. The affection of the people generally would be enhanced if they would work more and talk less."

I wonder if the automotive industry would stand by and say nothing if moves on as large a scale as are being prepared against the railroads were being prepared against them. There is no question in my mind but that the hue and cry made by the automotive industry under similar circumstances would be greater by far than the so-called propaganda which you are criticizing the railroads for at the present time.

I am satisfied that if the railroads could feel reasonably sure that no interference would be made with their program for a reasonable length of time there could be an immediate reduction in freight rates. Would the automotive industry cut prices on their products immediately if they could not see into the future any further than the railroad industry can now.

It seems to me that it would be far more fitting for your paper to do what it can to put the railroads in a position where they can do more work and less talking. At the present time, being besieged from all angles, it takes a considerable amount of their time, money and energy to combat some of this radical propaganda.

W. F. KASPER,  
Chief Engineer and Manager of Sales,  
Fairmont Railway Motors, Inc.

UNDER an amendment recently passed, the law of the State of New York requiring the licensing of engineers becomes mandatory on Aug. 1, 1923.

Laws similar to that in New York have been enacted in the following States:

Arizona, Colorado, Florida, Georgia, Idaho, Illinois, Iowa, Michigan, Minnesota, New Jersey, New Mexico, North Carolina, North Dakota, Oregon, Pennsylvania, South Dakota, Virginia, West Virginia, Wisconsin and Wyoming.

These laws have been mandatory for some time and apparently require the registration of engineers who are doing engineering work of a responsible nature in either public or private capacity. In general, from four to six years of professional experience and education is required to qualify for registration. In some of the States, United States employees and employees of registered engineers are exempted from registration.



# Dealer Financing Is Factory Problem

## Easing Credit Situation

### One Way to Keep Good Retailers in Business

By Harry Tipper

**"YOU** remember talking about why dealers quit this business, when you jammed into me on the cost of marketing some time ago? Well, I've been finding out something in these last two weeks."

James Chance had his feet under the president's desk after a trip to some of the dealers. Evidently he had things on his mind that wouldn't brook much delay; had to get them off his chest right away.

"Why, yes, I remember very well, Jim. It appeared to cost us a lot of money to get the dealers and then a lot more money to replace some of them. So I wondered why these fellows kept dropping out. You say you have found some reasons—that's good. Go ahead, I'm interested."

"Yes! I not only got some reasons, but I've got a problem, too. One that calls for a decision and a settlement. Darned if I know, right now, what to do about it, especially as there are some others of the same kind which will depend on what we do in this case."

"You know Jones, our dealer at Clinkerville. Well, Jones is really responsible for the trip I made."

"I knew something was wrong with him all this spring. He has been slow taking deliveries of cars lately and kicked a lot about everything from discounts to shipping."

"But I wasn't prepared for the dope in his letter. He must have rolled a blue Monday, sleepless night and rotten digestion all into the composition of that spiel. Said he hadn't been able to make money, used car situation was not right, couldn't see how he could continue with all the bother and worry, and some fellow wanted to buy the business at a price that looked good to him if I would transfer the franchise."

**"I** REMEMBERED what you said about these men quitting the business, so I decided to look up friend Jones in his native haunts, so to speak. He's been a dealer for us for about four years and always made good—sold a lot of cars, too. I didn't want to transfer any franchise. I wanted Jones to stay in the business in Clinkerville. So I hopped the train and dropped in to see him. Thought I'd make it casual and find out about some other places at the same time, so I fixed up a two weeks' jaunt."

"What did you find out? Anything really wrong with Jones? Seemed an alert man with a good business head when I met him," remarked President Billings.

"Anything wrong? Everything was wrong when I got there. I landed in on him early in the day, just after he'd been tussling with a tight-fisted citizen on a trade, and he was ready for me. He fussed around and waited for a while and then he began to spill his troubles."

"The used car business was worrying him. He lost money on it, he said. Then he spoke about time sales. They were bothering him. The upshot of it was that I

**T**HE president of the Planet Motor Car Co. tells the sales manager that it is the duty of the company to help its dealers stay in business. The sales manager is afraid that it means going into banking.

went over his books, his stock and his general condition and the biggest trouble, in my mind, was financing."

"How do you mean, financing?" asked the president.

"Well, like most dealers, he started on a small capital, a shoestring, to be correct, and his business has grown so fast that he's been up to the top of his credit all the time and, consequently, the banker doesn't think him very safe."

**"I**F he accumulates a few cars, or his used car stuff hangs fire for a week or two, or if our shipments get bunched somehow, one or two, he has no surplus of credit or capital to take up the slack and keep going in good shape."

"Of course, he ought to make more money, but he would do that if he could finance himself a little better. I talked with the banker. He wasn't much inclined to loosen up at all. Said Jones was good, but his statement showed he had limited resources and the bank couldn't afford to have more than a certain amount of his paper at any time."

"The banker and I talked at length, and before I left he agreed to look into the matter further. What worries me, however, is the thought of the number of dealers in Jones' position, hampered by a business that has grown so fast."

"Most dealers started on a shoestring and I guess a lot of them are in Jones' position."

"What are we going to do about it, Jim?" asked the president.

"I don't know. We're not bankers and can't go into the financing business."

"That's true, but we are interested in keeping Jones in business, and all the other dealers, so we can't just say we're not bankers and let it go at that."

"Well, it's got me. Should I go to the local bankers and help our dealers get the right funds; should we guarantee the extra credit, or should we consign some of the goods? It's a tough problem any way you look at it."

"I'll get Jones fixed up all right, but how about the other fellows?"

"Well, Jim, maybe the same medicine will work in other cases. At any rate we had better investigate further before we make a policy, and then probably it would be good business to handle each case as an individual matter for the present."

"We can, at any rate, convince the bankers that we are behind our dealers and watching their welfare. Probably, in a number of cases, that will be sufficient. Any way, it's our problem and it's up to us to put some planning and thought behind it. I congratulate you, Jim. We're beginning to get somewhere on this dealer thing. Let's discuss each case for the present until we have more facts. Then maybe we can make a policy."

# AUTOMOTIVE INDUSTRIES

## AUTOMOBILE

Reg. U. S. Pat. Off.

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## Silver-Lined Clouds

THE labor shortage which has existed for several months in the automotive industry may not be an unmixed evil in the opinion of Charles Piez, president of the Link-Belt Co. Piez points out in a recent statement that the inability of manufacturers to get sufficient workers may help to prevent overproduction and consequent inflation. He warns, also, against the dangers of bidding for a labor supply that doesn't exist, points out that the industry can't do three years' business in a single year and that a reasonably straight production curve is highly desirable.

While there is nothing startling in the conclusions reached by Piez, they serve to emphasize certain facts of importance to other automotive executives. Demands for drastic changes in the immigration laws which were made as soon as a labor shortage became apparent were not based on a thorough consideration of the future possibilities of such alterations. Present methods may be quite imperfect, but it is not

logical to bring into this country large numbers of immigrants to meet an immediate industrial need unless it is going to be possible to take care of these new citizens when orders become slack and business falls off.

The automotive industry has preserved its balance remarkably well during the last eighteen months. Facing the greatest demand for cars ever experienced, manufacturers have held down production costs, refrained from overexpansion, and watched inventories carefully. Most of them have set to work to get a greater output per man without waiting for unlikely changes in the immigration law. Continuance of these policies will result in permanent prosperity.

## Making Use of Live Information

THE factory sales department needs exact information at all times about the changing trends of retail trade, both as regards territories and individual dealers. Weekly or monthly reports from distributors or dealers may give much useful data of this kind. Many factories ask dealers and distributors to fill out every month a blank containing fifty or a hundred items relating to number of cars sold, used cars taken in trade, used cars sold, value of trade-ins, salesmen employed, number of cars serviced, unfilled parts orders, and so forth.

Knowledge of all these things aids the sales manager materially in judging the condition and efficiency of a dealer and in determining how to help the dealer to do a better job.

But two major difficulties have arisen in connection with such reports. First, it is difficult to get the dealers to send them in promptly and regularly. Second, failure to analyze and coordinate the information given often results in a need for more filing space without a corresponding increase in constructive action.

A few factories are powerful enough to get the information required simply by insisting that it be sent in. The dealer has to be sold on the idea in most cases, however, as he doesn't see offhand how writing reports will be of any use to him. He must be convinced that the information is needed if the factory is to back him up to the fullest extent.

One way to sell the dealer is to make some real use of the reports after they have been turned in. It is not enough for them to cross the sales manager's desk to be "looked over." Cumulative month-to-month records should be built up by the research department to develop brief and accurate pictures of how given dealers have conducted their businesses. Each report should be read carefully when it comes in and should be used as a basis for the next contact the factory expects to have with the particular dealer, whether by mail or through a traveling man.

Reports from dealers at stated intervals are needed as a basis for merchandising plans. Adequate and useful information can be obtained only by systematic handling of the data when it arrives at the factory sales department and by giving the dealer some idea from time to time of the use to which his reports are being put.



## Better Brake Design and Construction Should Result from Current Discussion

SOME of the leading engineers of the country are by no means convinced that front wheel brakes are a necessity even on large high grade cars, but there is little if any disposition to doubt the need for better and more powerful brakes which will stay in dependable condition for a much longer period than is now generally the case.

One prominent parts maker is reported to have said that if his customers would pay a reasonable price for really well constructed rear wheel brakes front wheel brakes would never be required. Others consider that a well-made propeller shaft brake is better than extra brakes on the front wheels when the complication and other disadvantages of the latter are taken into consideration. While it is realized that adhesion between ground and rear tires is a limiting factor unless front wheel brakes are employed and that many rear wheel braking systems are capable of locking the rear wheels, it is contended that, as now constructed, but few brakes can always be depended upon to function properly, especially when subjected to continuous application on long grades.

However this may be, there is certainly much room for improvement both in the design and construction of the brakes generally employed. Workmanship on brake parts has seldom been of the same high standard which has proved necessary on most other units. Heretofore one could do an indifferent job on the brake mechanism and "get away with it" as the expression goes. Fortunately the day of such brakes is drawing to a close. Owners have learned that better brakes can be obtained and are demanding the safety and convenience which they afford. Various police authorities, moreover, are preparing to see that suitable brakes are fitted and kept in proper condition.

Car manufacturers are rapidly becoming aware of these facts, but some are not yet convinced that the complication and expense of

front wheel brakes is warranted, at least until it is definitely proved that well-made brakes of other types are inadequate.

Some hold to the view that the case for the front wheel brake is not yet proved on any score, due especially to possible interference with steering control. Even the advocates of this system admit that locked front wheels render the car unsteerable and endeavor to so design and adjust such brakes that locked front wheels are impossible. In some cases the layout is such that the act of steering tends to release the front wheel brake, rendering it less effective when the wheels are cramped. If, with this arrangement, steering is made harder, or the brakes less effective on a curve, or when the vehicle must make a sudden turn—as it must often do in an emergency—there is grave reason to doubt whether the braking is any safer with four than with two-wheel brakes. Considerations such as this have undoubtedly led several French makers to use servo mechanisms, thus adding further complication and expense.

When front and rear brakes are interconnected, as they usually are, the adjustment is generally such that the rear brakes are applied first and supposedly such that the front wheels cannot be locked. Under these circumstances some means should be used to make the adjustment fool proof, or such that an incompetent mechanic cannot, by an incorrect adjustment, defeat the purpose of the designer. It is doubted whether all four-wheel brake systems have provisions of this character.

Whether four-wheel brakes come or go will depend in part upon the solution of, or failure to, solve the problems outlined above. The encouraging feature of the situation is the fact that American manufacturers are turning the limelight on brakes with the prospect that this important feature of car construction will be subjected to a much-needed overhauling.

## Month Will Be Slow in Output Activities

**Closing of Some Departments  
Will Affect Total Production  
of Cars in July**

NEW YORK, July 9—With an estimated output of 375,000 cars and trucks during June, the industry fell short by 18,000 of meeting the mark set in May, which was the peak month in the production history of the industry. Operations were sustained at high speed up to the third week, when car manufacturers began to take steps to place their plants in condition for fall business. This necessitated closing some departments, although there was no actual cessation of activities.

What was experienced in the last week of June will become more pronounced this month and perhaps next as a greater number of plants make preparation for future operations, with a few of them closing down for a brief time. Such an inventory period as the industry is entering naturally is accompanied by curtailed operations, which cannot be construed as a reflection of any alarming diminishing of interest on the part of prospective buyers throughout the country.

### Buying Continues Uneven

Buying interest is being maintained in a remarkable degree, although it continues uneven. Leading distributing centers report a volume of business extraordinary for this season of the year, but few hold out hopes that the demand will be sustained at its present level. The holiday acted as a stimulus to sales the first part of this month, but will be followed by a normal period of quiet in the retail field. This situation is to be expected and, coming with the temporary lull in manufacturing operations, will permit producers to catch up on back orders and meet the lessened current demand without overstocking dealers.

Deliveries of closed models have been slow for some time despite the straining of facilities in body-making plants, and orders have piled up as a result. Open-car weather will go far toward depleting the stocks of that type which have accumulated in dealers' hands as the result of the unexpected demand for the closed car. Conditions in the used-car market have improved, slow deliveries of new cars and more concentration laid on the merchandising of these vehicles being largely responsible for the slightly

(Continued on page 103)

## Business in Brief

NEW YORK, July 11—A mid-summer week embracing a holiday is not one in which decisive changes in business take place, and last week was no exception. Retail trade and industry continue to experience a large business, but slight recessions are noted in most lines. Activity in the main is due to past orders. Commodity prices show a slight decline. Merchants and manufacturers are disinclined to place orders far in advance, there being much hesitancy in accumulating large stocks.

One of the favorable signs which indicate the steady activity of industry is the report of freight car loadings for the week ending June 23. For the fourth time this year loading aggregated over one million cars. The total for the week aggregated 1,002,740 cars, a decrease of 4513 from the week previous. The decline was mainly in manufactured articles. Forest products continue to hold the pre-eminent place, indicating steady activity in the building field.

In spite of expected recession in steel production that industry is making a very good showing. Some lines are still making a heavy call on steel output but the spread between consumption and production has lessened. Pig iron prices are softening, but steel prices in general are at a standstill.

The stock market was very erratic last week and there seems to be much divergence in opinion as to its cause. Prevailing caution has left professionals rather a free hand. The agricultural situation is not very favorable and there is some speculation as to farmer buying power materializing to the amount expected.

## Long Acquires Worcester Plant for Bay State Car

WORCESTER, MASS., July 11—The R. H. Long Motor Co. of Framingham has bought the large factory erected by the R. H. Long Co. on Milbrook Street, this city, some time ago, for the manufacture of shoes.

The land and buildings are assessed at \$870,000, and the latter were erected before Long became a motor car manufacturer.

Just before the plant was finished Long planned to make both shoes and motor cars, or motor car bodies here. No cars were ever started in this plant, but now that it has been turned over to the automobile company work will start immediately so that production of the "Bay State" car may be increased.

## Outlook for Summer "Fair", Say Dealers

**N. A. C. C. Directors, Meeting in  
Buffalo, Get Reports of  
Seasonal Decline**

BUFFALO, July 11—The outlook for the summer months in sales of automobiles is "fair," according to reports received by the directors of the National Automobile Chamber of Commerce, who held their July meeting at the Buffalo Country Club today as guests of President Charles Clifton. General business is spotty, they learned, but better than last year at this time.

Confirmation of the usual seasonal decline was obtained in reports from dealers who state that in most territories there has been a falling off in sales. San Francisco is below normal, while in Colorado it is expected that business will be fair throughout July and August. Atlanta, Ga., reports good business, but a seasonal decline is expected.

### Wichita Business Good

Chicago says fair, but Peoria is looking for good business, the outlook being declared very favorable. Wichita, Kan., has good business, but crop prospects are reduced. Boston is looking for a 20 per cent decline in July and August, while Saginaw, Mich., finds plenty of prospects.

St. Louis states that conditions are much improved, while Omaha has experienced a slight increase in business. Fargo, N. D., is not looking for much until the crops show up.

The used car market apparently is good in Atlanta, Chicago, Indianapolis, Boston and New York. In Atlanta, the twenty-one members of the Used Car Statistical Bureau have 300 cars on hand. Kansas City is overstocked, with prices too high to move the cars. Boston says it can sell all standard makes at reasonable prices. In St. Louis light cars are selling well, but the heavy ones are moving slowly. Cincinnati also has a ready market for low-priced used cars.

There is a wide variation in percentage of sales involving trade-ins. This runs at about 40 per cent in Boston and Charleston, and as high as 90 in Missouri, Ohio and other communities.

### Closed Car Demand Keeps Up

Closed car demand keeps up, especially in northern and western territories. The range is from 30 to 35 per cent in Boston to as high as 90 per cent in Colorado.

Interested in the traffic situation, the directors were told that no special efforts are being made in many sections, while in others campaigns are being carried on in the matter of safety education and stricter law enforcement. In several of the big cities newspaper campaigns are being waged and vigilance committees are assisting the authorities in solving traffic problems.



## Heaslet Named Head of Rollin Motors Co.

R. T. Hodgkins Is Vice-President  
and C. D. Fleming, Secretary-Treasurer

CLEVELAND, July 10—Executives who will guide the destinies of the recently organized Rollin Motors Co. of this city have been named by Rollin H. White, chairman of the board of directors.

James G. Heaslet has been chosen as president; R. T. Hodgkins, vice-president and general sales manager, and C. D. Fleming, secretary and treasurer, all men well known in the industry. Heaslet formerly was vice-president in charge of engineering and production of the Studebaker Corp. and for years has been looked upon as one of the leading production experts in the country.

Hodgkins formerly was general sales manager of the Studebaker Corp., and prior to that was sales manager of the engineering division of the Yale & Towne Corp. Fleming also is a former Studebaker executive, having served as assistant treasurer at the Detroit plant.

The Rollin car, which the company expects to have in full production during the early fall season, is a four-cylinder model into which Rollin H. White has worked out many ideas gained in the twenty years he served as vice-president in charge of engineering and production of the White Motor Co., of which he was one of the founders.

The car will be manufactured in the plant of the Cleveland Tractor Co.

## Noteholder Asks Receiver for Maker of Ace Trucks

NEWARK, OHIO, July 10—F. M. Black, holding notes totaling \$12,000, has applied for the appointment of a receiver for the American Motor Truck Co., maker of the Ace truck, claiming that his and other judgments found against the company cannot be satisfied.

The American Motor Truck Co. was incorporated March 1, 1918, purchasing the assets and business of the Blair Motor Truck Co. of this city, with a plant capacity of from 1000 to 1200 trucks annually. The capital stock consists of \$500,000 common and \$1,000,000 7 per cent cumulative preferred, of which there is outstanding \$400,000 common and \$1,000,000 preferred, par \$100, with no funded stock.

Officers are: J. D. Potter, president and general manager; E. B. Phillips, vice-president, and E. B. Alspach, secretary and treasurer. Directors are C. H. Spencer, Roderic Jones, E. B. Phillips, F. M. Black of Newark and J. D. Potter, C. E. Morris, F. M. Sayre and Dwight Harrison of Columbus.

## FORD BUYS WAYSIDE INN

BOSTON, July 11—Henry Ford has bought the Wayside Inn, at South Sud-

## Truck Dealers, to Make Money, Must Understand Situation in Used Vehicle Field

By O. W. HAYES,  
President of the Republic Motor Truck Co., Inc.

Alma, Mich., July 11.

REGARDLESS of the buying trend in the passenger car field, we are confident of a good live motor truck market through the balance of the year, basing our conclusions solely on the general business strength of the country. So long as general business is good there will be a healthy demand for trucks.

Difficulties experienced by truck companies in obtaining good dealers in the past three years have largely eliminated themselves in the face of existing good conditions, and we find dealers practically everywhere desirous of taking on truck representation that we may have a share in the business that is breaking.

The used truck situation is serious, especially at this time, in view of the comparative inexperience of dealers in this field. Passenger car dealers have learned through experience how to lessen and avoid difficulties engendered by allowances on trade-ins, but a large number of truck dealers have taken on lines only recently and they are being victimized to a certain extent for want of knowledge of existing conditions in this field.

Manufacturers in the truck field should see to it that their dealers are made conversant with conditions which have been permitted to develop and instruct them how to overcome them. A large part of the truck business now being done involves trade-ins and if a dealer is to sell trucks and make money he should know thoroughly the used truck situation.

There are many ways in which manufacturers can help their dealers in this connection without setting up practises which experience in other lines has shown to be unsound. Creation of fictitious values that large allowances may be made in trades is not a way out of the situation, although the sale of trucks at the present time is being influenced by these to some extent. A short campaign of education on real values would do much to set the truck buying public right on this point.

At Republic we are developing a policy of keeping closely in touch with the affairs of the dealer so that he may progress safely through the early stages of developing his truck business. Throughout the territories we are instructing dealers to keep safely within the bounds of business that they can handle at a profit and not to seek deals in which they compete on an unsound basis. Business is being solicited from dealers only on a month to month basis so that they may have a safe turnover without tying up their credits.

Reports received from the field indicate prospects of continued good truck business generally, but with increasing demand from the Pacific Coast, the South and the Middle West. Whether the farmer will be a heavy buyer when his crops are sold is a question. He was expected to be a heavy buyer in the fall last year but was not. Undoubtedly the farmer will be in a much better financial condition than last year and there is reason to believe he will buy.

There is this certainty, he has not been buying trucks for three years and equipment is near the wearing-out stage. Truck stocks in the farm territories have been cleared out and if buying starts the effects will be in evidence immediately in greater factory activity.

bury, which was the inspiration of Longfellow's "Tales of a Wayside Inn," and which is more than 200 years old. He will preserve it as an historical museum. The purchase includes the 140-acre estate of William E. Bright, which adjoins the Inn on the west.

## UNITED & GLOBE RECEIVERS

NEWARK, N. J., July 11—J. Philip Bird and Henry J. Haigh have been appointed receivers in equity for the United & Globe Rubber Corp., of Trenton, manufacturer of U & G tires, by Federal Judge Runyon. The receivers are authorized to conduct the business for three months. Bird is president of the company.

## Durant Incorporates American Plate Glass

NEW YORK, July 11—The American Plate Glass Corp., incorporated in Delaware, has been organized to take over the assets of the American Plate Glass Co. of Kane, Pa., purchased several months ago by W. C. Durant. The capital will consist of 700,000 shares of no par common stock.

A. H. Gaffney, who was president and general manager of the old company, will be continued in the same office. Carroll Downes will be vice-president; C. F. Daly, treasurer and H. F. Herbermann, secretary. The officers and W. C. Durant will make up the board of directors.

## Courts in Harmony in Overland Action

### Toledo Extends Restraining Order Pending Outcome of Buffalo Hearing

TOLEDO, July 9—Extension of the temporary order restraining the Willys-Overland Co. from transferring the 739,866 shares of its common stock, held by receivers of the Willys Corp., has been granted until July 23, and in the meantime Judge John M. Killits, in the local United States District Court, is studying carefully the question of jurisdiction.

The court at the hearing last Friday intimated that he would get in touch with Judge Knox of the southern district of New York and possibly arrange to meet with him at the Buffalo hearing on July 23.

Attorney Rathbun Fuller for Willys-Overland submitted a motion on behalf of the company, seeking to quash the service of the order.

The motion for a temporary injunction was made on behalf of the first preferred stockholders of the Willys corporation by Attorney E. L. Williams of Cotton & Franklin, New York.

#### Seeks to Dismiss Proceedings

Attorney E. J. Marshall of Marshall & Fraser, on behalf of the creditors, moved the dismissal of the whole proceeding and explained that the creditors wanted the question of jurisdiction settled first. He explained that the creditors were merely interested in getting the money for their claims.

"The jurisdiction of this court has been asserted already," declared Judge Killits. "But that was not based upon any close study of the question. The position of this court must not be misunderstood. There is no disposition or effort here on the part of the court to tie the hands of Judge Knox."

"This court would vastly prefer to adjust the matters concurrently with the New York court."

Judge Killits said that there was no doubt but that both courts would agree upon what was right and proper in the question of the sale of stock, as the aims would be the same—that of administering the property in hands of receivers to the best interests of all.

#### Willys-Overland Not Involved

The Tracy plan which contemplates furnishing \$3,000,000 with which to pay off creditors and then allowing the first preferred stockholders of the Willys Corp. an option to purchase shares of the Overland common on a favorable basis, it is believed, gives the first preferred stockholders of the Willys Corp. a substantial equity in this particular asset after creditors have been satisfied.

The plan submitted by Tracy also contemplates concurrent jurisdiction of the two courts.

President John N. Willys announced upon his return here from New York that the whole court action had nothing to do with the Willys-Overland Co., and that there were no factions on its board.

The statement was called forth by the open discussion of the apparent fight for control of common stock being waged in the court action by Henry Thompson, a Toledo man, chairman of the board, and interests friendly to Willys, who is president.

"It is regrettable that any misleading statements involving the Willys-Overland Co. should have been drawn into the settlement of Willys Corp. affairs," Willys declared.

"I control, with my friends, at the present time the majority of the preferred stock which exercises the only voting power and will continue to do so until all back dividends are paid."

"I was astonished to read all this talk about factions in the Willys-Overland board of directors. So far as I know, there are no factions. My single interest is to work for the best interests of stockholders and dealers of the company. We have completed the best six months in our history, with prospects ahead for an indefinite continuance of this condition, and I am confident that I have the support of every director who shares with me the responsibility in carrying forward Willys-Overland policies."

Willys said that he would oppose any attempt to sell any of the assets of the Willys Corp. without giving the utmost consideration to the interests of "the thousands of small investors who purchased Willys Corp. preferred stock."

He characterized the bid of the creditors as one which "would take away from these small investors their one great asset which is rapidly increasing in potential value."

### General Motors Adding to Factory at Oshawa

OSHAWA, ONT., July 9—General Motors has awarded a contract for the erection of an assembling plant 600 x 100 ft. immediately north of its present factory. A second building to be built west of the present office structure and to be used as a maintenance station and driveway building is also planned. In this station dealers will receive instruction on the best methods for servicing cars.

The assembly plant will be finished by Nov. 1. It will relieve congestion in some other departments and facilitate the assembly of the Cadillac, Oldsmobile and Oakland.

#### FISK CURTAILING OUTPUT

CHICOPEE FALLS, MASS., July 11—In conformance with the custom of curtailing production at this season of the year, Fisk Rubber Co. went on a five-day week July 9, eliminating the Saturday morning shift. It is thought the temporary reduction may involve laying off about 5 per cent of the plant force.

## C. O. Miniger Closes Option on USL Stock

### Turns Over to Willys Corp. Receivers \$500,000 for Block of Preferred

TOLEDO, July 9—Clement O. Miniger, president of the Electric Auto-Lite Co., who recently took an option on a large block of preferred stock of the United States Light & Heat Corp., formerly owned by the Willys Corp., has closed the option and turned over about \$500,000 to the receivers for the Willys Corp.

The receivers now have approximately \$1,000,000 on hand.

Although 78 per cent of the adjudicated claims have been paid, there remains a total of \$4,647,773 in unpaid claims against the receivers.

Of this total unpaid \$2,948,000 represents unadjudicated claims and Government tax claims since written down to a total of \$1,227,000. The total of allowed claims remains \$3,420,773 yet to be paid.

Among the assets of the corporation yet undisposed of are shares of Fisk Rubber Co. common, Connecticut Telephone & Electric Co., Knight-American Patents Co., and both common and preferred stock of Doehler Die Casting Co.

### Stewart-Warner Position Now Best in Its History

CHICAGO, July 10—Encouraging prospects for the automotive industry for the next three months are found in the business report of the Stewart-Warner Speedometer Corp.

The company reports that instead of cancellations of orders, as some forecasters had predicted, automobile manufacturers are actually increasing their orders for July, August and September delivery. Sales through branches and dealers throughout the country are reported good and maintained evenly.

Business of the company in the first six months of this year was the greatest of any like period in its history, exceeding by 63 per cent the sales in the first six months of 1922. The company reports that it has no bank loans and that its cash position is the best in the history of the corporation.

### Templar Stockholders Working to Buy Plant

CLEVELAND, July 9—The syndicate of stockholders which is trying to sell enough preferred stock with a bonus of common to take over the plant of the Templar Motor Co. when it is sold by the receiver has received subscriptions in excess of \$200,000.

They propose to raise \$2,500,000, although it is possible that amount will not be required to take over the plant.



## Weekly Savings Plan Aid to Ford Dealers

Has Brought Them Into Contact  
with Prospects Not Known  
of Before

NEW YORK, July 10—The weekly payment plan of the Ford Motor Co. has been in operation now for three months, but as yet dealers have not had an opportunity to determine to just what an extent it has benefited them in the way of definite sales.

It will be another month before the first of those who enrolled will be able to make the first payments on the new cars and obtain delivery, it requiring four months at \$5 a week to make the necessary saving. However, dealers already have profited through the plan, it is declared, by being brought into contact with prospects who were not thought to be in the market.

Reports from various sections of the country as to how the plan is working out are "spotty" in that in some cities it has made an instantaneous hit, while in others the public has been somewhat lukewarm. As reported by correspondents the situation may be summed up as follows.

LOS ANGELES.—The Ford weekly purchase plan is proving so successful that bankers are running large advertising copy on this subject independent of Ford car copy. Bankers say the plan stimulates saving, and although originated to bring about the purchase of an automobile, they believe that the saving habit will be formed as a result of the experiment.

CLEVELAND.—The Ford weekly saving plan has been of material assistance to the agencies here and helped make June, 1923, the largest June in Ford history here.

DALLAS.—Bankers here are not taking much interest in the Ford plan, but Ford dealers report a considerable number of sales. Dealers in some other makes have adopted a similar plan in many sections of the State.

DES MOINES.—The Ford plan has met with fairly successful results here. From information secured from four Ford dealers, it is thought that approximately 150 savings accounts have been opened.

SEATTLE.—The Ford plan is taking well. It has taken time to get the plan over to prospects, but wage earners, as they see others getting cars on time, are warming up to the proposition.

DENVER.—Fifteen hundred and eighty-two enrollments were reported up to June 20 in the territory supplied by Denver. The ten Denver dealer organizations are in the midst of a two-team contest with a total of 613 enrollments since May 28. This has tended to overcome a slump that has become somewhat of a problem in the city, and road salesmen are also helping the outside dealers.

One road salesman, for example, signed up fifteen enrollments for a small-town dealer in one day.

CHICAGO.—The Ford weekly purchase plan has met with varied response here. Dealers who have gone after orders with aggressive salesmanship have been able to procure them in satisfactory volume.

MINNEAPOLIS.—The Ford plan seems to have created an average of 15 to 20 per cent in sales.

MILWAUKEE.—Ford dealers are oversold and usually are fifteen to thirty days behind on deliveries. So far comparatively few have taken advantage of the weekly purchase plan, prospective buyers in most instances preferring to make the regular down payment when they find it necessary to take advantage of partial payment plans. Bankers accepting deposits say the number of applications hardly is up to expectations, although qualifying this by expressing the belief that it will take from six to nine months longer to test out the plan properly.

PHILADELPHIA.—The Ford plan is working out fairly well but unevenly, some dealers having not stock of any kind for sale, even Fordsons, while others have open cars on hand in good supply.

INDIANAPOLIS.—The Ford plan is working out well here, where it was in force before adoption by the Ford factory. Sales are still ahead of deliveries with many local and State dealers.

TOLEDO.—The Ford plan is working out "just fair," according to dealers and "not so good" in the opinion of some bankers. About twenty a week is the rate buyers are signing up for the plan.

KANSAS CITY.—Ford dealers are having a good average response to the plan, those working hard getting fair results. A good many who enroll find means within a few weeks to secure sufficient money to complete the first payment and to get their cars at once.

PITTSBURGH.—Ford dealers here state that the plan is working out satisfactorily in this district.

ST. LOUIS.—The plan is working out fairly well here, St. Louis being slow to take up with a new idea. However, a number of new accours have been started and some deliveries made.

CINCINNATI.—The Ford plan seems to be meeting with only fair success. Most persons desiring this make of car seem to be able to obtain the cash to pay for it.

ATLANTA.—The local branch states that the plan is proving unusually successful, bringing about a material increase in Ford sales.

## Factories in Cleveland Cut Force 11.4 Per Cent

CLEVELAND, July 10—Factories in Cleveland reduced the number of employees during June, the automobile plants making the largest curtailments. The number of employees in eighteen factories in the automobile manufacturing industry on June 30 was 11.4 per cent less than on May 31.

## Enthusiasm Shown in 4-Wheel Brakes

Rickenbacker, Due to Response,  
May Confine Output to Cars  
So Equipped

DETROIT, July 11—As a direct result of its four-wheel brake announcement, Rickenbacker Motor Co. reports that it has received upward of 500 applications for dealerships in the last week, 170 coming in one day, Thursday. The response by dealers and public was such that the company declares itself fully convinced that the next several months will find it confining practically all of its schedule to the four-wheel brake car.

Its dealer organization, the company declares, is especially enthusiastic over the sales possibilities of the four-wheel brake model, and a large number of shipping specifications for the new model were filed. Dealers in every territory wired congratulations on the achievement, their telegrams conveying the impression that the four-wheel brake idea will be received by the public, especially in the cities, with the greatest favor.

The company reports many telegrams direct to the factory from police traffic executives in important cities, in which the four-wheel brake is lauded as essential to safety and assuring the company of their cooperation in promoting the general use of cars thus equipped. There is hardly any doubt, the company declares, that the four-wheel brake will go over with a bang, especially in view of the fact that several other companies are expected to announce its equipment within a short time.

## Output to Be Apportioned

Orders for four-wheel brakes cars since the announcement have come in such volume from distributors that the company declares itself assured of maximum business for the balance of the year. It will be several months, however, before it is able to get into large production on the new models, and in the meanwhile output will be spread over the entire sales organization, so that all dealers may have demonstrators.

Orders from dealers, especially in the larger cities, have been received in such number, the company said, that it could place the entire production facilities of the plant on the four-wheel brake models and not meet demand. This, however, will not be done, owing to manufacturing reasons and the continuing consistent demand for the regular brake-equipped models, but there is likelihood that within three months the bulk of the production run will be four-wheel brakes.

## DODGE'S HALF YEAR'S SALES

DETROIT, July 10—For the first six months of 1923 Dodge Brothers sales totaled 104,000 cars, which compares with 85,890 in the last six months of 1922.

## Scientific Loading Effects Big Saving

Industry Has Made \$50,000,000  
in Eight Years Through  
Better Methods

DETROIT, July 10—Application of scientific methods to the loading of automobiles in freight cars has saved the industry \$50,000,000 in eight years; has reduced claims for damage to a minimum, as indicated by the reports of the American Railroad Association; has meant large savings in material and labor in the actual work of loading, and has made available for the requirements of the industry and industry generally many hundreds of freight cars annually which otherwise would have been tied up.

Details of the economies of proper loading were laid before a group of automobile traffic managers at a dinner in this city by E. S. Evans, president of E. S. Evans & Co., which makes a specialty of loading devices for the industry. Dating his details of saving from 1915, when the first real work in this line was undertaken, Evans showed the advances that have been made, and indicated the freight car shortages that might now be experienced if early shipping methods were still being used.

### More Automobiles in Each Car

The biggest item of saving has been in getting more automobiles into a car. This was accomplished principally by double-decking cars through a system perfected by Richard E. Baud of the Studebaker Corp. and Alfred Copony. Weight of the decks perfected was 225 lb. as compared with the previous average of 675 lb., a saving in freight rates alone of \$10 a car on long distance shipments, and approximately twice that figure when lumber and labor are considered. The deck was further perfected in 1919 by an improvement which permitted decking without removing wheels.

In 1915, when 500,000 automobiles were shipped by rail, estimates of claims for damaged automobiles were \$2,400,000. Exact figures are not obtainable, as it was not until 1921 that the railroad association began to classify automobile claims. Last year from an estimated shipment of nearly 2,000,000 cars by rail, claims were only \$893,927, or less than 50 cents per car shipped, a reduction from \$1,673,004 in 1921, when fewer cars were shipped.

### Loading Takes Less Time

In 1915 the average time a gang of four men required to load an automobile was from one to two hours. Under methods today the same job is done in fifteen minutes, including the removal and fastening of parts. Cars of the Maxwell size can now be loaded complete six in a car as compared with five formerly, and cars of Hupp and Packard sizes can be loaded five and four re-

spectively, one more in each instance than formerly.

The Evans company is manufacturing all of its devices used in loading. Timber is bought and cut to requirements at the source, saving the cost of shipping on waste. Finished blocks ready for loading use are delivered at automobile factories approximately as cheaply as manufacturers could buy rough timber. The company is controlling the lumber output from five mills located in the South and State of Washington. An idea of the amount of lumber used in car shipping can be gained from the fact that the company is said to be the largest buyer of pine timber in Detroit.

## General Motors Places June Sales at 68,000

NEW YORK, July 10—Preliminary combined sales in June of the American and Canadian passenger car manufacturing divisions of General Motors totaled 68,000 cars and trucks.

This compares with preceding months and further with corresponding months of a year ago as follows:

	1923	1922
January	49,162	16,958
February	55,458	20,869
March	71,698	34,082
April	75,856	40,474
May	75,419	46,736
June	68,000	48,541
July		33,772
August		42,840
September		35,443
October		40,815
November		50,232
December		46,871

\* This preliminary figure includes Buick, Cadillac, Chevrolet, Oakland, Oldsmobile passenger and commercial cars and GMC trucks.

## Suit for Receivership Filed Against National

INDIANAPOLIS, July 9—Suit for receivership was filed here Friday against the National Motors Corp. and the old National Motor Car & Vehicle Corp., now a part of the merger, by W. H. Duval & Sons of New York. The suit is based on a judgment for \$10,987 obtained in April in the New York Supreme Court for velours trimming materials sold to the old National company.

"This is clearly a case of a disputed claim for material," said George M. Dickson, vice-president of the merger, manager of the local plant and former president of the old National Company. "The suit and the judgment against the company grew out of a disputed claim for velours trimming materials bought by the old company during 1920 and later found to be defective. Further shipments of the materials were ordered stopped and acceptance refused."

"Materials were shipped to this city and put in storage by those acting for the sales agents. Later the Duval concern, financial agents of the sales agents and material factory brought suit in New York and obtained judgment."

## Seek Standard Rim For Balloon Tires

Members of Committees of Association Will Determine Sizes  
at Early Meeting

BUFFALO, July 11—The new balloon tire was one of the chief topics of discussion at the quarterly meeting of the Tire and Rim Association of America, Inc., at the Hotel Statler today. More than fifty representatives of tire, rim, and rubber companies were present.

According to George L. Lavery, general manager of the association, the organization has a committee composed of representatives of tire and rim manufacturers which will meet at an early date to determine a standard sized rim for use in connection with the balloon type of tire.

"Many of the manufacturers," said S. P. Thacher, president of the association and assistant to the president of the United States Rubber Co., are now experimenting with the balloon tires. Through the association they are working out standards of rim sizes to go with the tires, tire dimensions, carrying capacities, proper inflation, pressure and so forth. In the old days the tire manufacturers made their own rims, so that it was nearly impossible to find a tire of one make to fit the rim manufactured by another concern."

Yesterday the board of directors of the association were guests of O. J. Rohde of the Wire Wheel Corp. of America at the Niagara Falls Golf Club.

Among those present at today's meeting were Walter H. Allen of the B. F. Goodrich Co., J. E. Hale, Firestone Tire & Rubber Co.; C. L. Moody, Fisk Rubber Co.; R. C. Griffith, Miller Rubber Co.; R. C. Brunner, Goodyear Tire & Rubber Co., and S. P. Thacher, United States Tires Co.

## Immel Plant Buyer Acts to Foreclose Mortgage

COLUMBUS, OHIO, July 11—Action has been started by Frank A. Benue of this city against the Buckeye Body Co. and the Coats Steam Car Co. to foreclose on a first mortgage of \$100,978 on the plant of the former Immel Co., which was taken over by the two named defendants.

Benue as purchaser of the plant from the receivers of the Immel Co., transferred it to the Buckeye Body Co., which in turn transferred to the Coats Steam Car Co., and payments on the mortgage, it is alleged have not been forthcoming.

Steps are in progress for a reorganization of the Coats company which announces that it will soon put on the market a steam car selling around \$1,040. T. E. Moore, vice-president of the company is also acting as sales-manager in place of A. D. Coats, who resigned recently.



## Men of the Industry and What They Are Doing

### Fred A. Aldrich to Retire

Fred A. Aldrich, one of the industry's pioneers, will retire as secretary-treasurer of Dort Motor Car Co. on July 15 and will be succeeded in that position by W. B. Warren, now assistant treasurer. The announcement was coupled with a statement by Aldrich to the effect that he planned a long rest. Aldrich was associated with J. Dallas Dort, head of the Dort company, and W. C. Durant in the old Durant-Dort carriage industry and entered the automobile industry at the time they did. When Dort and Durant separated to found individual companies Aldrich stayed with Dort, holding the secretary and treasurer positions since the start.

### Messinger Heads Chain Belt

C. R. Messinger has succeeded William C. Frye as president of the Chain Belt Co. of Milwaukee. Frye retires from active participation in the affairs of the company after seven years as president and twenty-eight years' association with the concern, which manufactures chain, concrete mixers and conveying machinery under the trade name of Rex. Messinger is advanced from vice-president and general manager, positions he has held since 1917. In addition to being prominent in the affairs of the American Malleable Castings Association, Messinger has just finished a term as president of the American Foundrymen's Association.

### Weschler Hendee President

Frank J. Weschler has been elected president of the Hendee Manufacturing Co., to fill the place made vacant by the recent death of Henry H. Skinner. Weschler for some time served as treasurer of the company, and last year, upon the retirement of Col. Lindley D. Hubbell from the concern, was chosen vice-president and general manager. Before entering the field of motorcycle manufactures, Weschler had preparatory experience in the bicycle industry. These officers were reelected: Vice-president, W. E. Gilbert; treasurer, John D. Stephens, and secretary, Parmley Hanford.

### Purves Succeeds Bonner

William M. Purves has been appointed sales manager of Gray Motor Corp., succeeding D. Henry Bonner, who is leaving to become associated with the Bonner Marks Co., Gray distributor at Canandaigua, N. Y. Purves was recently in the sales organization of C. H. Wills & Co. and previously had been connected with the sales department of Ford and Hupp.

### Duesenberg Advances Williamson

George O. Williamson, who served as assistant purchasing agent for the Duesenberg Automobile & Motors Co. of

Indianapolis, has been made purchasing agent to fill the vacancy caused by the death of George H. Dalrymple. Mr. Dalrymple, who was also a director of the company, died on Friday following an operation. Previous to his connection with the Duesenberg company Williamson served for five years in the purchasing department of the Lexington Motor Co. of Connersville, Ind.

### Fred Wilson Resigns

Fred Wilson has resigned as sales manager of the Stutz Motor Car Co. of America. His plans for the future have not been disclosed. Wilson has been at the head of Stutz sales for several years and has a wide acquaintance among dealers and manufacturers.

### H. J. C. Miller in Overland Branch

H. J. C. Miller, formerly sales manager of the Winton Co. of Cleveland and at one time manager of the Winton New York branch, has joined the staff of the New York branch of the Willys-Overland Co.

### Fralick with Parish & Bingham

L. J. Fralick has resigned from the Hydraulic Pressed Steel Co. to become associated with the sales department of the Parish & Bingham Corp. of Cleveland, of which J. E. Maloney is general sales manager. Fralick has had thirteen years' experience in the pressed steel business.

### Grundy Manages Steel Sales

George H. Grundy has been appointed manager of steel sales for Peter A. Frasse & Co. of New York. His headquarters will be at the general offices in New York City.

### Dr. Harper Liaison Officer

Dr. Henry Harper, physicist at the United States Bureau of Standards, has been detailed in New York as liaison officer between the American engineering standards committee of the Engineering Societies of the United States and the bureau. Dr. Harper is succeeding Dr. A. S. McAllister, who has been recalled to Washington to take charge of some special work in relation to commodity standards and specifications recently inaugurated by the bureau.

### Duffy Goes to South Africa

E. C. Duffy has been transferred to South Africa as sales representative of the International Harvester Co. He has been with the company for twenty-one years, nineteen of which have been spent in sales service in Canada. Since 1918 he has handled motor truck sales in the Dominion.

### Dinner for William R. Wilson

Ninety executives of the Maxwell-Chalmers organization gave a dinner at the Detroit Athletic Club, at which William Robert Wilson was the guest of honor. The dinner was to celebrate Wilson's second anniversary as head of the combined companies. John J. Plath, director of sales, acted as toastmaster, while the responses were made by the three vice-presidents, W. Ledyard Mitchell, Arthur E. Barker and B. E. Hutchinson.

### Reeves to Speak in Detroit

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will speak before the Rotary Club of Detroit on July 18, his subject being "Putting America on Wheels." Richard Harfst, manager of the Detroit Cadillac branch, is chairman of the committee on speakers.

### Blauman Rejoins Die Castings Maker

Louis W. Blauman is again sales representative of the Light Manufacturing & Foundry Co. of Pottstown, Pa., maker of die castings.

### Zimmerman Foreign Trade Expert

A. Zimmerman, for many years foreign representative of the Metz Motor Car Co. of Walton, Mass., in Egypt, Palestine, Turkey and Greece, has been appointed foreign trade expert in the Automotive Division of the United States Department of Commerce. He will be in charge of developing foreign markets for passenger cars, trucks, motorcycles, motor buses, marine engines and aircraft, serving as aide to M. H. Hoepli, acting chief of the division. Before serving as foreign representative for the Metz company, Zimmerman was affiliated with the Hendee Manufacturing Co., at Springfield, Mass., and with the Harley-Davidson Co. at Milwaukee.

### Mulch Manages Durant in Canada

R. H. Mulch, who has been connected with W. C. Durant's enterprises for a number of years most recently as sales manager of the Star Motor Co. of Canada, has been appointed general manager of Durant Motors of Canada, Ltd., with headquarters at the Leaside, Toronto, plant. Mulch takes up his new duties July 15.

### MacManus Appoints Prof. Haake

MacManus Incorporated of Detroit announces the appointment of Prof. Alfred P. Haake as the head of its Bureau of Industrial Economics. Prof. Haake comes from Rutgers College, where he was professor of economics and head of that school. Previous to that he was professor of economics at the University of Wisconsin, attaining that title within seven years after his graduation from the institution.

## Dealer Drive Made by Republic Truck

**Branches Will Be Eliminated and  
Product Handled Through  
Distributors**

DETROIT, July 9—Republic Motor Truck Co., Inc., is working on a schedule of 250 trucks in July and August, with prospects of continuing at this figure or in excess of it in the later months of the year. Business is good in all models, according to O. W. Hayes, president and general manager, with the majority of sales, however, in the ton, ton and half and two and one-half-ton models.

The company will do away with all branches under present sales plans, and will sell its product through distributors. It is making a drive for dealers, in which Hayes declares it is meeting with great success, as dealers apparently have become convinced that there is good opportunity for profits in truck business now, and that there is good prospect of the market continuing.

### Car Dealers to Handle Trucks

In the larger cities the company will seek for distribution through dealers specializing in the truck field, but in the smaller cities will sign contracts with car dealers who are equipped to handle truck sales. In all its contracts it is specifying the necessity of dealers signing for trucks only on a month-to-month basis, so that there will be no possibility of stocks accumulating.

The company is building its own bodies and cabs for certain standardized complete models. By standardizing bodies for certain classes of work, the company has been able to effect important economies for users, Hayes says. No attempt will be made, however, to build bodies for special requirements.

## Classes of Buyers Shift, Paige Tabulation Shows

DETROIT, July 10—Distribution of Paige and Jewett cars in June according to occupation shows the largest buying class to be foremen, mechanics, machinists, miners, mill-workers and laborers, these taking 15.5 per cent of the total sales, which approximated 5000 cars. The next buying class is merchants with 7.4 per cent, farmers ranking third with 6.6, the same percentage being achieved by sales in the building trades.

Each of these classes represents a considerable gain over sales in May, in which month the percentages for each of the classes in order was 10.3, 5.6, 5.7 and 4.7. In May the largest buying class was executives and manufacturers, these ranking fifth this month with 5 per cent as against 11.3. The remainder of the classifications in June is as follows:

Salesmen, 3.7; women, 3.5; real estate

and insurance, 3; clerks, 2.8; physicians, 2.6; engineers, 2.5; railroad employees, 2.3; garage and accessories, 2.3; hotel, restaurant proprietors, 1.9; Government and municipal, 1.8; retired, 1.8.

Grocery and meats, 1.3; taxicab and livery, 1.1; baker, 1; oil, 1; teachers, 1; bankers, 0.9; barbers, 0.9; drugs, 0.9; printers and publishers, 0.6; undertakers, 0.5; miscellaneous, 5.5, and occupation not given, 16.

## Brightman Brothers Buy Plant Site in Columbus

COLUMBUS, OHIO, July 9—Brightman Brothers Co., a new organization, has been incorporated and will manufacture hexagon steel bar nuts, shafting machinery and straightening machinery. It is incorporated for \$250,000 and has purchased a tract of land in South Columbus, where it expects to be in operation within ninety days.

Later on the company will add turned and drawn shafting, screw stock and cold drawn products to its line. All the officers of the concern formerly were connected with the Brightman Manufacturing Co. of Columbus. They are: President, C. W. Brightman; vice-president and treasurer, C. F. Brightman; vice-president, H. M. Brightman; secretary, H. L. Brightman, and assistant secretary, T. L. Brightman.

## Westcott Will Certify to Worth of Used Cars

SPRINGFIELD, OHIO, July 11—As an aid to dealers in marketing used cars, the Westcott Motor Car Co. will issue a Certificate of Good Value in the nature of a guarantee on all Westcott used cars sold by its representatives. This certificate is issued only when Westcott reconditioning requirements have been met. Explaining the plan, the Westcott company says:

"The Certificate of Good Value carries the trade mark of the Westcott Motor Car Co. and is signed by the dealer. On the inside is a plain statement of just what has been done in the way of overhauling the car. Each operation is set forth with the cost of each item. The name of each part replaced is given and its cost is set forth. On the last page there is given a recapitulation of all work and all cost items are added."

## 100 Chinese Merchants Inspect Durant Factory

NEW YORK, July 9—As guests of Durant Motors, Inc., 100 members of the Chinese Merchants Association of New York visited the corporation's plant at Elizabeth, N. J., last Friday.

Nearly all of the Chinese are Durant partners, holding stock not only in the automobile-making subsidiaries, but also in the new Durant bank. They were shown how Star cars are manufactured and were entertained at luncheon, when the company's executives told their guests what Durant Motors, Inc., is doing.

## 24,126 Hupps Sold in First 6 Months

**Company Schedules Production  
of 20,000 Cars for the Last  
Half of This Year**

DETROIT, July 10—Hupp Motor Car Corp. sales in the first half of the year totaled 24,126, the second quarter being slightly in excess of the first. This total compares with 17,689 in the first half of last year, and represents approximately 62 per cent of the output of 40,000 scheduled for the year. O. C. Hutchinson, general sales manager, said the company is outlining a schedule of 20,000 for the last six months.

Comparison of the first half's business with that in other years shows it is 37 per cent in excess of the same period last year; it is in excess of the entire year of 1920, and represents 75 per cent of the combined business for both 1920 and 1921, and 70 per cent of the total business in 1922.

President Charles D. Hastings says the outlook for summer and fall business in the South and Middle West is exceptionally good. Business for these sections in the last few weeks and at the present time is larger than at any previous time. Distribution of cars in the large cities of the country and in many rural districts is behind orders, he states.

The factory investigations and reports from distributors throughout the territory indicate that business in the last six months of this year will be better than in the last half of 1922, Hastings says. Sales to the farmer in the last half will exceed those of any previous year if crops and prices continue to develop as now indicated, he declares.

## Flint School Prepares Men for Buick Service

FLINT, MICH., July 9—The Flint Institute of Technology, a division of the Industrial Mutual Association of this city, has inaugurated a Buick service course at cost, open to the country at large and sponsored by Buick.

This school enables the student to qualify in a three months' course to hold a position in one of the Buick service stations. The tuition fee is small, and the entrant is given forty-four hours' training each week, including lectures by Buick officials, inspection trips through the Buick plant and instruction in the use of modern service machinery. Examinations are held at the end of the course, and those persons qualifying are given certificates endorsed by the Buick company.

Classes are limited to thirty, and the first one begins its work Sept. 10. Succeeding classes will be formed every four weeks thereafter. Applicants who first receive the endorsement of Buick dealers will be favored in the selection process.



## South Is Expecting Good Cotton Prices

### Conditions Somewhat Unsettled at Present Along All Lines of Activity

BIRMINGHAM, ALA., July 11—"One thousand new automobiles were sold in Jefferson County, Ala., each month thus far during 1923." This statement originates from a follower of the State statistics on cars registered in Jefferson County and a careful estimate made by him on the number of cars for which new license plates were not obtained. Jefferson County is Birmingham's location on the map.

#### County to Absorb 12,000 Cars

Conservative estimates place the total number of new cars to be sold in Birmingham and Jefferson County during the year of 1923 as slightly more than 12,000. This is based on the number sold during the first five months, which exceeded 5000 by more than 1000, and the monthly rate of registration. Many of the cars sold have not been delivered to date. It is thought that the cars not delivered will keep the months from June to August, inclusive, up to the 1000-mark for deliveries, and that the months from September to December will take care of themselves.

One agency estimates that there will be 20,000 Ford cars and trucks sold in Alabama during 1923. Of these cars 7000 will be sold in Jefferson County and Birmingham, according to this estimate. Birmingham agencies are ahead of this estimate to date. The Alabama territory is looked after by Atlanta, Memphis and New Orleans branches of the Ford Motor Co. New Orleans handles southern Alabama; Memphis, northern Alabama, and Atlanta, central Alabama, including Birmingham and Montgomery.

It is understood that the Atlanta branch of the Ford company was assigned 29,000 cars for the year of 1923; this was increased through the efforts of the branch management to 50,000. The Atlanta branch estimates that 50,000 cars and trucks will be 12,000 short of the number it will need for the business in its territory.

#### Sales by Distributors

The Drennen Motor Car Co. of Birmingham had sold over 500 Buicks, 150 Cadillacs and 72 Federal trucks during the first five months of 1923. The Brownell Motor Co. of Birmingham, Dodge Brothers agents, led the Southeast two months during the first five of this year and has never had enough cars to fill its orders. This concern is now purchasing used Dodges to take care of the demand for this variety of used car.

Used-car stocks of practically every automobile concern in Birmingham were cut to a minimum during the past month. The Drennen company sold 400 used cars in the first five months of the year.

During the first half of June it sold more than 125 used cars. One week's sales of used cars total more than seventy-two.

All the automobile concerns of Birmingham have done a record business during the first five months of 1923, with possibly one exception. The general conditions prevailing in this territory have been excellent.

From these figures it will be seen that automobile sales in Jefferson County, Birmingham, Alabama and the Southeast are on a scale that has never before obtained in the history of the industry.

#### 130,000 License Tags Bought

License tags to the number of 130,000 were purchased by the automobile license department of the State of Alabama for the year 1922-1923, which ends Sept. 30. It is estimated that every tag will be sold by that time. Should this estimate prove correct, Alabama will show an increase in automobiles of almost 40,000, or almost 45 per cent of the total number registered during 1922.

License tags aggregating 165,000 have been ordered for the automobiles contemplated to be used during the year 1923 to 1924. This estimate places the total gain to be expected during that year at 35,000 cars and trucks.

The figures of sales and estimates of future sales show the general sentiment of many in close touch with the situation in Alabama.

General conditions backing up the estimates of the large increase in the sale of automobiles would indicate optimism on the part of the people making the estimates.

At present, lumber, one of the principal products of the South, is finding a slow sale. Pig iron, one of Birmingham's main products, is not selling up to expectations. A buying movement in this industry is expected momentarily, however. Steel sales have slumped to an extent, but the Birmingham plants report orders sufficient to carry them through for at least ninety days. Industrially the South is not booming as it was six months ago, and in some lines has fallen behind the records made a year ago.

#### Much Hinges on Cotton Crop

On the cotton crop hangs more than a large proportion of the expected prosperity this fall. The weather conditions throughout the cotton producing area, with the exception of West Texas, Arizona, New Mexico and California, were exceedingly bad for cotton as late as the first of June but since that date they have improved greatly in the Southeastern States, and are reported somewhat better in States just west of the Mississippi.

The shortage of labor that is becoming more apparent throughout the cotton producing belt from Louisiana and Arkansas east is causing the cotton farmers more worry than the bad weather. The negroes of the South have gone north in increasing numbers, but

(Continued on page 100)

## Tire Makers Keeping Output at High Mark

### Inventories Increased During May While Figures Show Decline in Shipments

NEW YORK, July 9—May showed an increase in production of pneumatic casings, inner tubes and solid tires as compared with April, according to a compilation prepared by the Rubber Association of America for the Bureau of Foreign and Domestic Commerce.

A comparative table of inventory, production and shipments, as reported by the association, is as follows:

PNEUMATIC CASINGS				
1922—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	66	4,174,216	2,055,134	1,596,806
Feb. ....	66	4,691,329	2,084,308	1,562,365
Mar. ....	63	5,183,286	2,645,790	2,073,963
April ....	65	5,464,336	2,401,187	2,086,651
May ....	65	5,523,095	2,721,503	2,639,273
June ....	64	5,042,147	2,838,890	3,133,260
July ....	63	4,834,106	2,476,636	2,695,095
Aug. ....	63	4,629,392	2,905,209	3,029,823
Sept. ....	64	4,612,037	2,504,744	2,502,106
Oct. ....	64	4,682,958	2,674,662	2,588,770
Nov. ....	62	4,964,976	2,733,134	2,379,708
Dec. ....	59	4,599,208	2,656,942	2,934,078

1923—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	62	4,695,916	3,127,270	2,994,297
Feb. ....	60	5,224,387	3,217,987	2,588,639
Mar. ....	58	5,670,601	3,865,726	3,322,637
April ....	56	6,088,272	3,539,326	2,976,160
May ....	57	6,906,594	3,659,986	2,757,764

INNER TUBES				
1922—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	66	5,246,647	2,343,393	1,889,724
Feb. ....	65	6,141,956	2,596,744	1,702,533
Mar. ....	63	6,991,118	3,017,511	2,090,737
April ....	65	7,230,096	2,650,573	2,329,343
May ....	65	7,189,552	2,970,696	2,938,947
June ....	64	6,186,534	3,130,629	3,973,679
July ....	63	5,675,839	3,068,199	3,630,744
Aug. ....	63	5,207,228	3,808,224	4,220,055
Sept. ....	64	5,164,757	3,501,442	3,558,971
Oct. ....	64	5,488,033	3,787,758	3,420,680
Nov. ....	61	6,210,053	3,850,908	3,075,023
Dec. ....	59	5,732,125	3,411,074	3,825,949

1923—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	62	5,838,310	3,951,885	3,748,651
Feb. ....	60	6,771,958	4,039,202	3,001,697
Mar. ....	57	7,740,945	4,875,414	3,828,315
April ....	55	8,394,184	4,259,558	3,535,635
May ....	57	9,292,223	4,317,537	3,414,115

SOLID TIRES				
1922—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	11	181,769	40,224	33,294
Feb. ....	11	183,448	39,492	36,805
Mar. ....	11	182,197	49,433	48,350
April ....	11	173,748	46,664	52,309
May ....	11	170,904	57,640	60,711
June ....	11	169,808	66,089	63,408
July ....	11	176,375	71,505	60,425
Aug. ....	11	189,698	84,313	69,435
Sept. ....	11	200,016	82,767	66,797
Oct. ....	11	213,942	85,480	71,275
Nov. ....	11	234,684	85,775	61,466
Dec. ....	10	244,061	77,221	64,570

1923—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan. ....	11	262,462	83,343	60,611
Feb. ....	11	270,191	75,457	63,394
Mar. ....	11	265,843	79,788	77,144
April ....	10	260,631	71,468	72,609
May ....	10	268,323	77,293	67,117

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouse, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

## Ford Will Rely More on Own Steel Supply

### New Equipment Will Make Com- pany Less Dependent on Outside Sources

DETROIT, July 10—The extent to which the Ford Motor Co. will increase its steel capacity at the River Rouge plant as a result of equipment now being manufactured cannot be estimated accurately at this time, according to plant officials, but there will be a large increase and a consequent lessening of reliance on outside sources for steel supply.

The question as to the extent of Ford Steel making plans has been brought up by the commissioning of the General Electric Co. to build a large alternating current motor which is to drive a "blooming" mill in a "merchant" mill equipment at the Rouge plant. The motor is said to be the largest of its type ever constructed for steel mill use.

Some reason for the Ford steel plans may be found in the necessity of the company to increase its production in order to meet increased demand for its product. There is little question, however, but that the company is preparing to take up steel manufacture in a large way so as to make itself independent on all supply sources.

Its mining and timber purchases already have made it independent in these raw material sources and there remains at this time only steel to complete control of its operations from the raw to the finished product.

Ford's attitude on steel as on practically everything else going into his cars has been that he could manufacture it at less cost than he could buy it and at the same time protect himself against situations endangering the supply. The proposed introduction of the eight-hour day and its possible effects on prices and supplies is a case in point, a development which will be discounted to a great extent by Ford with his own steel mills in operation.

### More Parkways Planned to Relieve Congestion

NEW YORK, July 11—In a communication to the National Automobile Chamber of Commerce, C. B. Whitnall, secretary of the Milwaukee County Park Commission and Rural Planning Board, tells how Milwaukee will try to solve the traffic congestion problem by adding more parkways, which will facilitate movement in and out of the city, and at the same time build up suburban regions. Whitnall writes:

Milwaukee County has prepared a plan that appears to be the solution of this biggest problem of modern times. That is, the construction of parkways, radiating from the city along the three rivers and four creeks, affording the most beautiful building sites. These parkways are to extend well into the

country and are to be equipped with water, sewer, gas and electricity, telephones and a good driveway.

They will be elongated parks alongside of which outlying lands may be platted and building lots sold, relying upon the automobile to eliminate distance and time. We will have a higher grade of citizenship in consequence of this spreading out, made possible by our regional planning, which gives to the automobile the opportunity to prove its ability to merge the rural district with the city, whereby the essential and most desirable features of both will accrue to the community as a whole.

### Taxes May Force Cotton Men to Return to Mules

GALVESTON, TEX., July 10—The new tax on weight of trucks, weight of loads carried, horsepower, wheelbase, tires, gasoline and other items has increased the cost of operation to such an extent that draymen and cotton companies are seriously considering the use of mules and old-time drays for handling freight to and from ships.

For years the motor truck, especially constructed, has been a favorite of the exporters in hauling millions of bales of cotton from compresses to shipside and in taking cargoes from shipside to rail terminals.

An effort is being made to obtain a ruling on the tax laws favorable to this particular class of business, but the cotton men and shippers believe that will be impossible. They say it looks as if the Legislature has killed the truck so far as handling cotton is concerned, since the taxes imposed are such that operation is unprofitable.

### Yellow Cab Sending Out Foreign Representatives

CHICAGO, July 11—Following a conference of the export staff of the Yellow Cab Manufacturing Co., presided over by Gordon Lee, director of export sales. Harry A. Yagle was started on a year's trip around the world to investigate taxicab conditions and possibilities in China, India, Hawaii, New Zealand, Philippines, South Africa, the Malay Settlements, Egypt and other countries.

James Warner, Jr., has gone to South America, where he will assist in the organization of cab companies using the Yellow's system of operating, accounting and dispatching.

A. L. Hughes has been sent out as special representative in the Northwest, swinging across from Nova Scotia to Manitoba.

Announcement also is made that the first shipments of a fleet for Buenos Aires are now en route to the Argentine.

### 10,000TH RICKENBACKER

DETROIT, July 10—The ten-thousandth car came off the assembly line at the Rickenbacker plant last Friday and was awarded to Lafayette Markle, the Chicago distributor. There were thirty-five cars turned out that day, all fitted with four-wheel brakes and intended for the thirty-five distributors who were visiting the factory.

## New Stearns-Knight Shows Lowered List

### Prices Range from \$650 to \$1,250 Under Those of Former Models

CLEVELAND, July 10—Prices announced today for the new line of four-cylinder Stearns-Knight cars, which are shortly to have their appearance in the market are from \$650 to \$1,250 lower than the prices Stearns models have been selling for. It is a slashing reduction that was intended to make price as well as quality of car a prime consideration when a prospect looks over a Stearns-Knight.

The four and five-passenger open cars will sell for \$1,595, the coupé and brougham at \$1,995, and the five-passenger sedan, \$2,095. These are the models in the new line of fours.

The wheelbase has been reduced from 123 in. to 119 in., and the seven-passenger models have been eliminated, the highest carrying capacity being five. An increase in production with a lower cost per unit is forecast in this policy.

The new models will be in the hands of the dealers between Aug. 1 and 10. Within the next two weeks production will start in the large new addition that has been built at the plant. The building is completed, and the placing of machinery is all that remains to be done.

### Courier Prices Higher; New Sport Models Added

SANDUSKY, OHIO, July 11—A new schedule of prices has been announced by the Courier Motors Co. The prices on the Courier cars on the open models are from \$30 to \$60 above the former list, and with the exception of the standard coupé and sport brougham, prices are from \$20 to \$140 higher on the closed cars.

The standard roadster and sedan have been discontinued, and two new sport models introduced. The Courier company states that the increase in prices is due to the demand for extra equipment rather than increased manufacturing costs.

The following shows the latest schedule:

	Old Price	New Price
3-Pass. Sport Roadster.....	\$	\$1,395
5-Pass. Phaeton .....	1,235	1,295
4-Pass. Sport Phaeton.....	1,565	1,595
Standard Coupe .....	1,495	1,495
Sport Coupe .....		1,595
Sport Brougham .....	1,995	1,995
Standard Brougham .....	1,875	1,895
Sport Sedan .....	2,055	2,195

### TIRE MAKERS SELL PLANTS

PHOENIX, ARIZ., July 10—The San Diego Oil Products Co. of this city has bought from the Firestone Tire & Rubber Co. and the Goodyear Tire & Rubber Co. their cotton and cottonseed by-products plants.



## Rubber Association Urges New Planting

Chief Means of Averting Crisis,  
It Says, Is to Cultivate  
More Acreage

NEW YORK, July 10—Encouragement of the planting industry as a relief measure that will tend to avert a real crisis in the future production of crude rubber is advocated by the Rubber Association of America in a communication to its members inclosing a letter from H. Eric Miller, a member of the Stevenson committee, to H. Stuart Hotchkiss, chairman of the special committee of the Rubber Association of America which is investigating the restrictions of exports.

### Letter Is Price Brief

Miller's letter is in the nature of a brief to prove that it is necessary to sell No. 1 rubber at a price of 1/6d in order to satisfy the investor's reasonable requirements. He also figures that the planter spends at least £94½ per acre for the six years that are required before that acre produces rubber, which includes 15 per cent per year as interest on the investment. Cost of production is figured at 9d per pound, while the average yield is something between 360 and 400 pounds per acre, provided the trees are nursed judiciously.

In commenting on these data the Rubber Association of America says that it must be borne in mind that there has been little new rubber planted for the past several years and that it takes at least six years for new areas to come into bearing. "While it is probable that there will be no immediate physical shortage of rubber, it is statistically evident that a real crisis may develop later on, due to failure to open up new acreage," says A. L. Viles, general manager of the association.

Continuing, the Rubber Association's foreword says:

From an academic standpoint the Stevenson restriction plan is theoretically unsound as interfering with the natural laws of supply and demand, but from the practical standpoint of the American manufacturer the prime consideration must be an ample supply of raw material for all time at a reasonable price. To attain this result the planting industry must be placed on a basis sufficiently remunerative to attract new capital.

The special committee of this Rubber Association in charge of the crude rubber restriction matter has been primarily concerned with this long view of the situation, and it is to be hoped that manufacturers and the public will realize that the question of present restriction sinks into insignificance as compared with the necessity of getting more acreage under rubber to provide for the future. Restriction can and will eventually be relaxed up to the point of the maximum possibilities of existing areas, but any demands in excess of this must come from new planting.

The Rubber Association of America heart-

ily indorses every effort to interest American capital in planting on the sound basis that investments be made with a full knowledge of the facts, so that when new plantations are established they will be permanent producers and the effort will not be wasted because of having made a non-competitive or uneconomic start.

Miller's letter to Hotchkiss goes into lengthy detail, bringing out production costs and the big investments required before the new plantations come into bearing. Looking at the situation from the investor's viewpoint, he believes it is necessary to expend £60 per acre on land, development, equipment and bringing into bearing which may be divided up approximately as follows:

1st year—£20 plus 15%—£23
2nd year—£10 plus 15% on £30—£4½
3d year—£5 plus 15% on £35—£5¼
4th year—£5 plus 15% on £40—£6
5th year—£5 plus 15% on £45—£6¾
6th year—£15 plus 15% on £60—£9
£60
£34½

Commenting on this table, Miller says:

As no revenue has yet been forthcoming you really have a debit of £94½ on your investment account, and as your rubber trees are still only in partial bearing at this stage and your investment account would have to be charged up with some of the interest which will not be covered by profits it is not far wrong to take £100 as representing your investment of cash plus interest of 15 per cent until your rubber trees are in full bearing.

### Sets Necessary Net Profit

The cost price of each pound of rubber c.l.f. is shown to be 9d per pound in full bearing; therefore to maintain a yield of 15 per cent on £100 you will require a net profit of 9d per pound. All your rubber is not first quality, so that a profit of 9½d on your No. 1 quality is required. Adding a ½d per pound for amortization, you arrive at a market price of 1/7d per pound for No. 1 grades in New York or London to give the 15 per cent return. As far as British capital is concerned income tax will have to be paid by the investor out of that 15 per cent which reduces the attractiveness of it considerably.

Miller also states that the membership of the Rubber Growers Association is 917, comprised of 534 companies and 383 individuals. Statistics of 521 operating companies show the following: Authorized capital, £101,064,524; issued capital, £79,593,523; acreage owned, 2,561,842; acreage planted or interplanted, rubber, 1,202,018. Of this total 288 of the companies operate in Malaya, ninety-eight in Ceylon, forty in Sumatra and thirty-eight in Java.

## Creditors File Petition Against Kentucky Wagon

LOUISVILLE, KY., July 7—An involuntary petition in bankruptcy against the Kentucky Wagon Manufacturing Co. was filed today in the United States District Court.

The petitioning creditors are Woodruff-Powell Lumber Co. of Indiana, with claims of \$1,056; the Electro-Chemical Engraving Co., with \$1,202, and the Miliken Battery Service Co., \$118.

## 14,722 Grays Built During Fiscal Year

Company Reports Orders on  
Hand Warrant Capacity Oper-  
ations for Two Months

DETROIT, July 10—In its fiscal year ending June 28 the Gray Motor Corp. built 14,722 cars, by far the largest part of which is represented in sales of the first six months of this year. The company ran considerably below the schedule outlined at the beginning of the year, this being due in large measure to inability to get into production at the time it planned, owing to manufacturing difficulties. In its showing for the last six months the company has come up fully to scheduled requirements. Present schedules approximate 150 daily.

Orders now on hand are sufficient to carry the company at full capacity for two months, and if business continues in the latter part of the calendar year as in the first, shipments will run in excess of 30,000, as orders were in excess of capacity in the early part of the year.

As a result of the showing in its first year, President F. L. Klingensmith said he expects to make large additions to the main plant here and also to proceed with his plans for developing sectional assembly plants if indications hold good for business in the remaining months of 1923.

The dealer and distributor organization built up in the first twelve months presents a nucleus highly satisfactory to the company, he said, and the company will devote every effort to developing and expanding it. Distribution has reached into most sections of the country, but there still are large territories to be covered. The success of the car in its first year, Klingensmith says, will be important in bringing in dealers who have waited while this development was in process. Exports are being made to thirty foreign countries.

## E. I. duPont Is Producing New Finisher for Bodies

WILMINGTON, DEL., July 11—The E. I. duPont de Nemours & Co. is now manufacturing in quantity a new body-finishing material made from a pyroxylin base which takes the place of finishing and color varnishes and is said to produce a much more durable finish. This product is described as an air-drying enamel and is marketed under the trade name "Duco."

It is applied by spraying over the usual primer and rough stuff. Two or three coats are said to give sufficient body to permit rubbing to a finishing surface of glass-like hardness. Only 15 min. are required for air-drying between coats, so that the time required for finishing by ordinary methods is greatly decreased.

## South Is Expecting Good Cotton Prices

Conditions Somewhat Unsettled  
at Present Along All Lines  
of Activity

(Continued from page 97)

this in itself would not make the shortage. The real exodus from the cotton fields has been to the industrial sections of the South.

No fair estimate of what the crop will be is obtainable at present. It is certain that the acreage originally planted was far in excess of that planted last year. It is also certain that large portions of this acreage were abandoned as cotton producing prospects when rain caused the necessity of replanting. The labor shortage enters into the question, as does the appearance of the boll weevil in many sections. On the whole estimates around 11,000,000 bales are being more favorably received throughout the cotton sales-centers of the South. Anything in excess of 11,250,000 is thought to be high.

### See Better Conditions in Fall

In case a crop of 10,000,000 bales is produced this year and the crop is fairly well distributed throughout the cotton producing area it will mean real prosperity, as there seems to be no way of forcing the price down on this commodity unless a crop in the neighborhood of 12,000,000 bales is produced.

In the face of the light demands for lumber, iron and other commodities produced throughout this territory the companies producing and manufacturing these commodities seem to expect a return of the heavy demand experienced during the winter of 1922 and the spring of 1923 by the fall of this year. The cotton situation is worrying many who are interested in the production and sale of this staple, but on the whole they expect excellent prices for the crop, and believe that unless there is a total crop failure general prosperity will result.

### Implement Sales Decline

ATLANTA, GA., July 11—For the first time this year the monthly business review of the Federal Reserve Bank of Atlanta shows a decline in tractor and farm implement sales as compared with the preceding month, the report for May business showing a decline of 16.2 per cent as compared with April.

However, a fairly substantial increase is maintained as compared with the same period of a year ago, May, 1923, showing an increase of 17.7 per cent over May, 1922.

The decline is said to be largely due to a deterioration in southern crop conditions occasioned by continued rains, a fact which is serving to decrease somewhat the buying power of the southern farmers and therefore is having quite an effect on sales.

## FEDERAL-AID ROADS LEAD TO ALL CITIES

WASHINGTON, July 10—A total of 187,406 miles will comprise the completed Federal-aid system of highways, which already have been definitely designated in thirty-four States, according to the Bureau of Public Roads of the United States Department of Agriculture.

The survey, just announced by the department, shows that practically every city of over 5000 population is located upon the Federal-aid highway system, and the few that are not will connect by improved roads. The figures show that 90 per cent of the entire population of the country lives within 10 miles of a Federal-aid highway.

There is still every promise, however, that financially at least the cotton industry will enjoy the largest year in its history as the price continues to hold firm around 30 cents per pound.

Tractor and implement sales for the first six months of 1923, as compared with the first six months of last year, will show an increase of approximately 40 to 50 per cent, the best six-month period the industry has ever enjoyed in this section.

## Used Car Market Slumps as New Models Come Out

PHILADELPHIA, July 11—Automobile dealers report, for the most part, a small stock of cars on hand. Those who have cars are anxious to dispose of them to make ready for the new models which are beginning to appear.

The market for used cars has shown a decided slump, as all models will suffer several hundred dollars' depreciation when the new models arrive.

The sale of accessories in bona-fide accessory shops continues to be very good.

## G. M. Truck Adds Paint Shop for New Body Job

PONTIAC, MICH., July 11—General Motors Truck Co. has added to its factory facilities here an entirely new paint shop to furnish complete jobs for the express body combinations just announced by the company.

There will be four combinations of express bodies for the one-ton models. Formerly the company made only the chassis, allowing the purchaser to buy the bodies wanted from other makers.

### CORRECTION

The Elk Machine Tool Corp. has bought and taken over the business of the Elk Manufacturing Co., maker of Precision machine tools, instead of the latter taking over the former, as stated in AUTOMOTIVE INDUSTRIES June 28.

## New Haven Railroad Developing Own Bus

Company Will Buy Parts and Assemble Them—Each Vehicle  
Will Cost \$35,000

NEW YORK, July 10—Experiments carried on by the New York, New Haven & Hartford Railroad to prove the utility of the gasoline rail car as an auxiliary in railroad operating have been so successful that the company's executives have decided to continue and to extend the service.

With this idea in mind the company is developing a super-motor bus that has been designed by its own engineers. Parts will be purchased and assembled by the company itself instead of being bought as complete units from manufacturers. This assembly will be handled at the Osgood-Bradley works, and it is figured the cost will be \$35,000.

### Designed for Sixty Passengers

The engine will develop 120 hp., and the chassis will be featured by double swivel trucks and double-end control, running on eight wheels. It is designed to carry sixty passengers and 4000 lb. of baggage, and to show a speed of 50 m.p.h. under favorable conditions.

Trailers will not be used, as it is found that there is not sufficient power to haul a trailer and make speed, and that there is no call for more capacity on the lines where the buses will be used.

The New Haven experiment started on the Narragansett Pier Railroad with a standard Mack truck chassis fitted with a special body built by J. G. Brill. Then the New Haven put on three more Macks with bodies built at the Osgood-Bradley works at Worcester. With this equipment the New Haven put the cars into service on branches where passenger density was not sufficient to warrant even the regular operation of a locomotive and two coaches.

### Comparative Cost of Operation

The costs per mile for operation of a thirty-five passenger rail car with four-cylinder engine and costs per mile on a steam train are figured as follows:

	Gasoline Rail Car	Steam Train
Fuel .....	\$0.05	\$0.267
Lubricating Oil.....	.005	.005
Depreciation .....	.10	.013*
Supplies .....	.007	.03
Enginehouse Expense .....	.025	.04
Wages .....	.16	.21
Repairs .....	.12	.25
Interest .....	.02	...
Car Repairs.....	...	.04
Car Depreciation.....	...	.008
Train Supplies.....	...	.02
Total .....	.487	.883

\*Engine and tender

The figures quoted on steam train operation are probably the minimum. In some cases, the gasoline cars are operated at a loss, due to the limited amount of traffic to be handled.



## South Africa Offers Field for Rail Cars

Use of Them Extended to Branch  
and Suburban Lines in Last  
Few Weeks

JOHANNESBURG, SOUTH AFRICA, June 12 (by mail)—It appears evident that the South African Railways, operated by the Union Government, is strongly opposed to the competition of road transport. The S. A. R. has always shown itself up-to-date as regards motor transport and operates many services for passengers and mails in the country districts. Perhaps that is the reason why it appears to be out to fight any opposition, feeling that it is quite able to cope with the situation.

It is a fact that the road between Johannesburg and Pretoria has never been worse than at present. Since the buses started running very little road maintenance work has been done. Railway forces between Johannesburg and Pretoria have been reduced considerably. During weekdays the fare is \$2 return and on Saturdays, \$1. The buses charge \$2.50. The train does 45 miles to get to Pretoria as against the 36 miles by road. It would be thought that time could be saved by the buses, but this has not been the case.

### Pretoria Service May End

The buses take from one hour and a half to two hours to do the trip, as the road is hilly and bad. The train takes an hour and a quarter for the longer distance, and makes two stops. It is quite within the bounds of possibility that the buses on the Pretoria service will have to stop operating. But apart from this one instance, motor transport for passenger-carrying is going ahead in town and country. In Johannesburg itself the buses now carry passengers in opposition to the municipal tramways in more than one suburb.

New routes are being opened up every month, and the municipality appears to be doing its best to kill the service. But the buses have the street cars whacked, although there are some very speedy types of trolley cars.

New car tracks are being put down, and existing ones shortened in an endeavor to beat the buses. But it is certain that in the long run the buses will win. As a matter of fact the municipality itself is ordering motor buses, and a strange position will be created if these have to be run against their own cars.

### Big Future Predicted

Motor rail cars are now being used on the railways. They have been employed for officials for years, but it is only during the last few weeks that they have been put into service on branch and suburban lines. There is a very big future indeed for rail cars in

this country—for branch lines that do not pay now can be made to yield profits if rail cars are used. It is good to know that the Government is fully alive to the situation.

About the beginning of June the "record run season" commences in South Africa. This is the dry season here and Transvaal and Natal motorists and motorecyclists go out to break records over hundreds of miles of "tracks." The distance from Durban to Johannesburg by road is about 400 miles. It has just been covered by a Chevrolet car in 11 hours 27 minutes—a wonderful performance considering the terrible state of the so-called road. The train takes about twenty hours, but has another 100 miles to do.

Dealers are all pleased with the car sales at present, but fully realize the danger of dumping, and are, good to relate, going very carefully.

M. EDWARD

## Tax Laws Too Stringent for Bus Lines in Iowa

DAVENPORT, IOWA, July 11—Bus lines throughout the State have curtailed their service and in many instances suspended operations because of the new license and tax law effective July 1. The new regulations are so burdensome and stringent that bus business cannot be maintained profitably, it is claimed.

The cost of carrying insurance to protect passengers and the eighth of a cent charge a ton-mile are the chief grievances. A test case is before the courts and if it is upheld, C. C. Richardson, Des Moines, head of the Iowa Transit Co., predicts wholesale suspension of business. Permit applications now before the railroad commission, which has full jurisdiction, are being held up pending the court ruling.

## Committee Will Change Freight Rates on Parts

NEW YORK, July 9—Freight rates on twenty different automobile parts will be affected by the decisions to be made by the Consolidated Freight Classification Committee at a meeting in Atlantic City on July 18.

The parts involved are bow sockets, tarpaulins, wheels, fenders, steel dashes, wood body parts, windshields, fiberboard body panels, steel freight bodies, transmission covers, steering wheels, radiator fans, bearings, floor boards, jacks, asbestos gaskets, packing devices, tire chains, seat risers and spark plug cores.

### TIMKEN AXLE AT GOOD PACE

DETROIT, July 9—In a statement issued by Fred Glover, president of the Timken-Detroit Axle Co., denial is made that the plant has closed down for ten days. Glover declares that there is no truth in such statements, that the company is operating at a satisfactory pace and that the plant worked all day on the Fourth and all of the previous Sundays in its effort to get goods out on time.

## All Lumber Salvaged at Ford Motor Plant

Special Department Formed as  
Conservation Agency Is Now  
Self-Sustaining

DETROIT, July 5—Ford Motor Co. is salvaging approximately 90,000,000 ft. of lumber annually at the Highland Park plant as its contribution to national forestry conservation.

A special salvage department, employing 800 men in three shifts, was formed primarily as a conservation agency, and while it was not the intention to make it profit-producing, it has progressed to a point where it is self-sustaining. The work of the department includes the operation of the lumber yard, saw mills and handling of new and old lumber for shipping.

Each factory unit of the company strives for 100 per cent lumber salvage, and all that is unusable for shipping is sent back to Highland Park by freight car or truck, where smaller pieces can be used better than at any other place. Incoming shipments of materials and equipment are unpacked at all plants in such a way that the boards can be re-used in outgoing shipments.

### Worn Out Box Cars Used

Instances of salvage work done show that recently 1500 worn out box cars of the D. T. & I. Railroad, owned by Ford, were torn down and converted into boxes and crates and other pieces that could be used in shipments. A pile of old logs at the Flat Rock plant, which had been used for piling for a temporary bridge was sawed into usable boards.

Standardization of shipping packages has helped in the salvaging process. Three years ago the company used 600 different sized boxes and crates. Today 95 per cent of the same shipments are made in boxes of fourteen different sizes, some meeting as many as 100 needs. Now forty-five boxes and crates fill all shipping requirements. The salvage department is turning out an average of 15,000 boxes and crates a day, and it is not uncommon for one box to have three or four different kinds of wood in it.

## Ford Will Build in South If Freight Rates Are Cut

ASHEVILLE, N. C., July 8—That the Ford Motor Co. will erect an assembling plant at Charlotte, N. C., at a cost of between \$500,000 and \$750,000, to employ about 700 men and assemble 300 cars daily, if it can get a reduction in the commodity rates on the railroads to apply to automobile parts, was announced at a three-day convention of Ford dealers from North and South Carolina and Virginia, held in this city.

It was indicated that the outlook was good for the reduction in rates.

## A.A.A. Will Survey Costs of Operation

### Bureau of Public Roads Requests It—Data Will Be Used in Highway Program

WASHINGTON, July 11—A national survey for the purpose of obtaining data regarding the cost of operation of motor vehicles in various sections of the country is being undertaken by the American Automobile Association at the request of the United States Bureau of Public Roads and the National Research Council. The information is to be used in carrying forward the road building program of the country.

The A. A. A. has asked each of its 300 affiliated clubs to cooperate by selecting interested members operating different makes of cars, who will keep records from Aug. 1, 1923, to Jan. 31, 1924.

The questionnaire which they will fill out is designed to show the type of vehicle used, the manner of its usage, the condition of the roads traveled, the total mileage for the period during which the records are kept, operating charges and the yearly fixed charges, including insurance, State license fees and motor vehicle taxes.

Provision also is made for showing the average life of tires in miles and the total cost of repairs, overhauling, etc., during the period.

This, it is claimed, is the first attempt to make a national survey whose object is to get accurate information on the cost of operation of motor vehicles and will be of great value both in its effects on road construction and on motor vehicle taxation. In addition, data that will be of high value to the automobile manufacturer will be obtained in an unprejudiced way.

### Gasoline Used in Texas Averages 45,000,000 Gals.

AUSTIN, TEX., July 11—An investigation just finished by A. W. Tabor of the Attorney General's Department of Texas shows that during the last five years a monthly average of 45,000,000 gal. of gasoline were sold in this State. The amount consumed is gradually increasing.

He says that if collections by the State are 100 per cent on the new 1-cent a gallon tax, there will be produced in revenue \$5,400,000 a year, three-fourths of which goes to the State highway fund and the remaining one-fourth to the available school fund.

In the opinion of State officials, it is not expected, however, that collections will be more than 75 per cent. Under the new gasoline tax law, passed at the last session of the Legislature, and now in effect, the tax must be paid by the refiner or wholesaler and importer. Gasoline manufactured in Texas but sold beyond the borders of the State is exempt

from taxation under the new law. It is claimed that nearly 75 per cent of the gasoline refined in Texas is sold to points outside the State.

### Tax Effective in Pennsylvania

HARRISBURG, PA., July 10—The new tax rate of 2 cents a gallon on gasoline under the terms of the new Henderson fuel oil tax law is now effective in Pennsylvania. The tax formerly was 1 cent a gallon. It is expected to add \$6,000,000 revenue annually to the State treasury.

All dealers must register with the auditor general, and those who neglect to do so are liable to a \$1,000 fine. The additional cent in the tax is an emergency sum for the ten-year period. The tax is collectible from the consumer by the dealer, and reports must be made quarterly instead of monthly, as formerly, to the State Treasurer.

## FINANCIAL NOTES

Hayes Wheel Co. reports gross sales for June aggregating more than \$1,900,000, a record for the company. Net sales for the first six months of the year were approximately \$10,000,000, compared with \$6,155,000 for the same period last year. Net earnings for the first six months will exceed \$1,000,000, after charges and depreciation but before taxes against the dividend requirement of \$200,000 for that period.

Nash Motors Co. has declared a dividend of \$3.50 a share on its common stock, payable Aug. 1 to stockholders of record July 20. The regular quarterly dividend of \$1.75 a share on the preferred A stock also has been allowed. Reports for the second quarter of the fiscal year show a net income after the usual deductions of \$2,568,405 as against \$1,573,241 for the previous quarter.

Indiana Truck Corp. has declared its regular quarterly dividend of 1 1/4 per cent on the preferred stock, payable July 1 to stockholders of record June 30.

Peerless Truck & Motor Corp. has declared two regular quarterly dividends of \$1 each, payable in September and December.

Aeromarine Plane & Motor Co. has filed an application with the Secretary of State of New York to increase its capital stock from \$10,000 to \$1,010,000.

### Peak Along Hudson River May Make Way for Road

NEW YORK, July 11—The Palisade Park Commission has broached the bold plan of removing the greater part of Hook Mountain, one of the highest peaks on the west shore of the Hudson River, just below Haverstraw, establishing in its place a playground.

The automobile is back of this movement, for the removal of the mountain would permit of the building of a road along the waterfront, relieving motorists of the necessity of driving around Hook Mountain between Nyack and Haverstraw.

It will be necessary to remove 10,000,000 cu. yd. of rock at an estimated cost of \$5,000,000. The State Legislature will be asked to give its sanction.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Trade in general has been somewhat quieter, with a slight falling off in the production of textiles, iron, steel and coal. Additional cotton mills in New England are operating on short time. The production of pig iron in June was 3,668,413 tons, a decline of 5 per cent from the May figures. Last month's steel output by companies reporting to the American Iron and Steel Institute was 3,574,567 tons, 11 per cent less than the production in May.

The latest crop reports show further improvement. In the Government forecast for July it is estimated that the value of this year's crops will exceed that of last year's by about \$1,000,000,000.

The general downward trend of prices continues. Fisher's index declined last week one point to 154, a new low for the year. Bradstreet's food index, however, recorded a slight gain of one cent to \$3.14, the first rise since mid-winter.

### Car Loadings Decline

The number of car loadings declined 4513 to 1,002,740 for the week ended June 23. Net earnings of Class I roads for May amounted to \$89,999,600, representing an annual return of 6.33 per cent on the tentative valuation, as compared with 6.48 per cent for April.

Sales of two principal mail order houses for June were \$24,945,353, showing a seasonal decline of about 15 per cent from the May figure.

Bank clearings and debits to individual accounts showed substantial gains for the week, in spite of the mid-week holiday. Bradstreet's figures for clearings at leading cities were \$7,670,001,000, an increase of 11.9 per cent over the preceding week. Debits reported by the Federal Reserve Board for the week ended July 3 (a five-day week) totaled \$10,089,465,000, as compared with \$9,405,439,000 for the preceding week—an increase of 7.3 per cent.

Discounts by the Federal Reserve banks increased \$154,000,000 during the week ended July 3, including the half-yearly settlement debt, while purchased bills declined \$5,300,000 and holdings of Government securities fell off \$40,300,000. Deposits increased \$37,700,000, member banks' reserves showing a gain of \$64,100,000 and Government deposits a loss of \$29,300,000. The circulation of Federal Reserve notes increased \$55,100,000, while reserves declined \$35,600,000. The reserve ratio fell from 76.9 per cent to 74.4 per cent.

### Member Banks Increase Loans

Loans of reporting member banks showed a gain of \$60,000,000 for the week ended June 27, the increase consisting mostly of loans secured by stocks and bonds. There was a decline of \$26,000,000 in holdings of Treasury notes and certificates and an approximately equal gain in United States bonds and other securities.



## Uruguay Will Stage First Show in Fall

Committee in Charge Fixes Dates  
Tentatively for September  
or October

MONTEVIDEO, URUGUAY, June 17 (by mail)—Plans are being completed, under the Centro Automovilista del Uruguay, for the first automobile exposition ever held here. The date for the showing has not been fixed definitely but the last two weeks of September or the first half of October have practically been decided upon.

The arrangements are being made by a committee composed of Lorenzo Torres Cladera, Percy Warner Tinan, Candido Daglio, Angel Varini, Carlos Polack, A. Perotti and Armando Matos.

Among the dealers and distributors who already have decided to enter the show are those representing Studebaker, Ford, Lincoln, Chandler, Cleveland, Cadillac, Hupmobile, Chevrolet, Chalmers, Renault, Dodge Brothers, Packard, Buick, Hudson, Essex, Overland and Willys-Knight.

A private exposition is now being held here by the local branch of the Studebaker Corp. of America, under direction of the Montevideo representative, Percy W. Tinan. The grand ball room of the Parque Hotel has been taken over for the four days commencing June 16 and Studebaker is showing seventeen models, ranging from a two-passenger roadster to a cabriolet. Hundreds of visitors already have attended the exposition and a sales success seems assured for this unusual but energetic exposition, which is being staged on a scale heretofore unknown in South America.

## Industry on Sound Basis, Declares Reserve Board

WASHINGTON, July 10—The Federal Reserve Board considers the automobile industry to be on a sound substantial basis "but with some curtailment being reported in volume during June," according to the July detailed analysis of business conditions, just made public.

The analysis says:

The number of automobiles produced and shipped both established new records and totals in May. Passenger car output aggregated 350,073, which was 2 per cent more than in April, while the output of trucks totaled 42,373—an increase of 15 per cent. However, some curtailment is reported in the volume manufactured during June, but many large factories are still operating at capacity.

The Cleveland Federal Reserve Bank reports large orders for future delivery of automobile bodies are being placed. Owing to the increased use of closed cars, the industry expects less curtailment in winter months than in the past. Reports from Chicago district indicate the supply of closed cars is not yet equal to the demand.

Reports from 230 automobile dealers in the St. Louis district state that sales declined sharply in May, but were 15 per cent larger than a year ago. The Federal Reserve Bank at San Francisco reports that purchasers of automobiles in its district were almost twice as large in the first four months of 1923 as in the same period of 1922.

## INDUSTRIAL NOTES

Kendell Motor Products Co., recently organized at Fort Wayne, Ind., has taken over the assets of the defunct Kendell Engineering Co. and will carry on the manufacture of the Kendell piston rings. Glenn A. Smiley, Christ Bruns and Robert L. Kendell have organized the new company, of which Kendell will become sales and advertising director. A small plant will be erected and it is hoped to be in production by fall.

Loneragan Automotive Radiator Co., Rock Island, Ill., has leased a factory building in that city and is moving there from its downtown location in Rockford. A daily output of 500 radiators is anticipated when complete machinery and equipment are in operation. The new site gives ample room for expansion as manufacturing may require.

The Blekre Tire & Rubber Co. of St. Paul has been incorporated for \$475,000. The incorporators are A. E. Blekre, S. E. Blekre and E. L. Larson, all of Minneapolis.

## Month Will Be Slow in Output Activities

(Continued from page 90)

more wholesome but still unsatisfactory tone that has been apparent in the last few weeks.

The outlook for sales of motor vehicles in farm sections is brighter as the season advances. The comparative dullness in agricultural districts is due chiefly to the fact that the farmer is now chiefly concerned with his crops, and is devoting little time to making purchases.

The decline in June output affected passenger cars entirely, estimates placing truck production for the month at 44,000, which is 1000 greater than in May, and reflects the constantly improving tone in this branch of the industry.

While parts plants are active, they necessarily will feel the effects of the lull in car-producing factories, although orders from truck builders will enable them to keep at a relatively high level.

## Virginia to Shut Down on Competing Bus Lines

RICHMOND, VA., July 10—The Virginia State Corporation Commission has announced that in the future it will refuse to grant a license for motor bus lines to compete with steam or electric lines between the same point, in cases where the latter are barely making expenses.

## METAL MARKETS

Relaxation is beginning to give way to languor in the steel market. While production is along normal midsummer lines, what little buying remained following the market's change of front has shrunk further. Judge Gary's intimation to steel consumers that the change to the eight-hour day involved a 15 per cent increase in production costs and "ought" to mean an increase of 15 per cent in the prices of steel products to them, "provided there is not sufficient profit without it," comes at a time when steel is the least of consumers' worries. The fact that consumers at this particular time need no steel, furnishes no valid reason, however, for ignoring the importance of the eight-hour day decision made by the steel industry and its bearing on the price of steel.

As Judge Gary intimated in his statement, improved mechanical facilities will be relied upon to a large extent as a means of overcoming not only the shortage in labor, but also its enhanced cost. Quite likely when these improvements and better efficiency methods have been introduced, it will be found that the estimate of a 15 per cent increase in costs was in excess of the actual addition to production costs caused by the eight-hour day. In the opinion of many with an efficiency engineering bent of mind the steel industry in a surprisingly short time should be able to overcome completely the burden entailed by the change to the eight-hour day, thus eliminating all additional costs.

It is interesting to note that now when the first marked signs of a falling off in fresh buying are in evidence, the same cry that was heard immediately following the war, that of the steel industry being over-equipped for normal demand, is again very much in evidence. This is only another way of saying that in times when producers are compelled to go scouting for orders, competition is too keen, and that the industry's salvation lies along the pathway of further absorptions, consolidations and mergers.

In one direction the steel industry, it is quite true, has not yet recovered its pre-war equilibrium. Consumers show no disposition so far to shoulder the risk of commitments by way of a reasonable anticipation of their wants. Either they fall all over themselves to obtain steel for the earliest possible delivery or they refuse to buy at any price. It remains to be seen how long consumers will continue to consider this state of affairs compatible with their own best interests. Like all commercial problems it is one of plain arithmetic. If by assuming the risk of having to carry reasonable tonnages of surplus or reserve stocks of steel, and by more nearly equalizing their demand over the entire year, consumers can prevent the abnormal price conditions which invariably ensue when the demand is "bunched" and must be satisfied in a relatively brief period, they may be the gainers in the long run.

**Pig Iron.**—The market for foundry and malleable pig iron is demoralized, but very few automotive foundries appear to be taking advantage of this situation.

**Aluminum.**—Small tonnages of aluminum are coming in from abroad, but nearly all of this metal has been sold long in advance. The S.S. Franconia, in from Liverpool a few days ago, brought a shipment of ingots, bars and sheets. Another shipment arrived on the S.S. Oscar II from Christiania.

**Copper.**—One of the leading market interests is cutting under the price of other producers.

# Calendar

## SHOWS

Nov. 4-10—New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.  
Nov. 11-17—New York, Annual Automobile Salon, Hotel Commodore.  
Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.

## FOREIGN SHOWS

Berlin.....Sept. 28-Oct. 7  
Automobile Show.  
Oct. 4-14—Paris, Passenger Cars, Bicycles, Motor-

cycles and Accessories, Grand Palais.

Oct. 15-20—London, Motorcycle Show, Olympia.

Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

Nov. 1-15—Buenos Aires, Annual Automobile Exposition, under the direction of the Automovil Club Argentino.

Nov. 2-10—London, Automobile Show, Olympia.

Nov. 22-Dec. 1—London, Motor Transport Exhibition.

Dec. 8-19—Brussels, Passenger Cars, Trucks, Airplanes

and Motor Boats, Aviation Palace.

## RACES

Sept. 3—Annual Pikes Peak Hill Climb.

Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, International Grand Prix for two liter.

## CONVENTIONS

Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of

Farm Equipment Manufacturers, Hotel Statler.

Nov. 12-17—Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.

## S. A. E. MEETINGS

Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.

Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

## MEETINGS

Sept. 19-21—Boston, Fall Meeting of the Motor and Accessory Manufacturers Association.

## Ideal Road Section Soon Will Be Opened

DETROIT, July 9—Such rapid progress has been made in building the Ideal Section of the Lincoln Highway that President J. Newton Gunn has called a meeting of the executive committee of the board of directors to consider plans for the formal opening and dedication of this strip which is claimed to represent the last word in highway construction.

The automobile industry has been most prominent in the building of the Ideal Section. On the executive committee are such well known manufacturers as Roy D. Chapin, Frank A. Seiberling, Alvan Macauley and J. N. Gunn. This meeting is to be held in New York City at an early date.

In addition to taking up dedication plans the committee also will consider plans for giving further national impetus to one of the association's primary objectives—the stimulating of greater interest and technical and non-technical consideration of the problems involved in the proper and businesslike expenditure of the hundreds of millions of dollars now being appropriated annually for highway construction.

Now that the Ideal Section is about completed it has been found that the paving has cost but \$65,000 a mile, a sum which is considered small when it is remembered that the paving is forty feet wide and ten inches thick, heavily reinforced with steel. Much larger sums have been expended on many sections of the Lincoln Highway for construction of less adequate width, it is claimed.

The Ideal Section is located in Lake County, Ind., near Chicago, and is declared by Lincoln Highway officials to be the finest piece of road on the American continent. Funds that made its construction possible were contributed by the United States Rubber Co. at the time Gunn was president of that company.

## TAXES STOP BUSES

WASHINGTON, July 10—The Alexandria Motor Bus line, operating more than a score of buses between this city, Alexandria, and Mount Vernon, George Washington's home, has discontinued

service and the buses have been taken to Baltimore. Discontinuance of the service was the result of State and city taxes which the bus operators declare drove them out of business.

## Massachusetts Opposes Advertising of Speed

BOSTON, July 11—How far may a motor vehicle registrar go in his efforts to check speeding?

That question was being asked among some of the motor dealers here as a result of the request by Frank A. Goodwin, motor vehicle registrar, to one of the dealers, to eliminate the reference in his advertising to the fact that the car was possible of going 80 m.p.h. The motor dealer complied and stopped advertisements from the factory scheduled for the Boston papers.

A year ago when one of the dealers made a quick run to Bretton Woods, and advertised that fact, Goodwin sent for him and told him it was not the proper thing to do. Some years previously Col. W. D. Sohler, chairman of the old Highway Commission, closed up tight for one week a dealer who advertised the fact that one of his cars traveled 250 miles a day for four days on Massachusetts highways within certain hours. Yet under the Massachusetts law there is no speed limit, provided the highways are clear of traffic.

## FORD MAKES NEW DAY'S MARK

DETROIT, July 5—Ford production figures for the week ending July 3 show a total of 40,368 cars and trucks for domestic requirements. A new daily high mark was set on June 30 when 6884 cars and trucks were built, an increase of 67 over the best previous day, June 13. Tractor production during the week was 1508 and Lincoln cars built totaled 171.

## RAUCH & LANG CAB CONTRACT

BOSTON, July 11—Rauch & Lang has secured the contract for the new fleet of taxicabs which the Fenway Garage Co. is putting in service to replace the older ones in use since the company began operations a few years ago.

## Gasoline Clog Halts Maughan's Air Flight

NEW YORK, July 10—A clogged gasoline line spoiled the attempt of Lieutenant Russell L. Maughan, army aviator, to fly from New York to San Francisco from dawn to dusk. The Curtiss pursuit plane which was used in the attempt came down near St. Joseph, Mo., after having completed 1330 miles of the flight in nine hours. In coming to earth the landing gear was damaged, and the record attempt was abandoned. At the time Maughan was an hour and a half behind schedule, caused by being lost in a fog.

An innovation in connection with this flight was the new system of refueling without stopping the engine, by which it was planned to cut the time at halts to fifteen minutes. In refueling, the gas tanks were opened from the bottom of the machine as far away as possible from the engine, and by means of a connecting hose gasoline was pumped at the rate of 30 gal. a minute without any extra fire risk. This is the first time, it is said, any system has been devised for refueling an airplane with the engine running, previous attempts to do so having failed on account of the blast of air from the propeller.

## Railroads Seek to Stop Hauling by Motor Truck

PHILADELPHIA, July 11—The Pennsylvania Railroad, the Philadelphia & Reading Railway and other carrying corporations are trying to prevent the issue of certificates of convenience by the Public Service Commission to applicants for the rights of common carriers who are motor truck line operators.

There are thirty-four such applicants who plan to transport freight and general merchandise from Philadelphia to points outside of the city and within the State. The principal points of destination asked for are Allentown, Bethlehem, Chester, Coatesville and Doylestown.

The railroads had a number of witnesses on the stand at a recent hearing to testify that they preferred the rail service to the trucks.